

U.S. Army Corps of Engineers

COPY

Final Technical Memorandum in Support of a Proposed Action Memorandum

Colonie Site
Colonie, New York

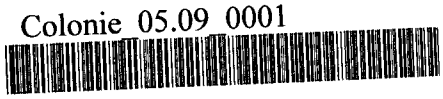
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PROPOSED

ACTION MEMORANDUM

June 1, 2001

Soil Removal at the Colonie Site
Colonie, NY

Formerly Utilized Sites Remedial Action Program (FUSRAP)

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I. PURPOSE

The purpose of this Action Memorandum is to document a revision to the Department of Energy (DOE) Action Memorandum issued in February 1997, to perform a soil removal action at the Colonie Site (the Site) in Colonie, NY under the Formerly Utilized Sites Remedial Action Program (FUSRAP). The Site consists of the Colonie Interim Storage Site (CISS) and the Town of Colonie property within the CISS. Past activities at the Site have resulted in the presence of uranium (U-238), thorium (Th-232), lead (Pb), copper (Cu), and arsenic (As) on the Site soils.

To provide a basis for a soil removal action at the Site, an Engineering Evaluation/Cost Analysis (EE/CA) was prepared and issued to the public on September 6, 1995. A Responsiveness Summary was prepared to address all comments received and was issued as an addendum to the EE/CA. Subsequently, the Department of Energy (DOE) prepared an Action Memorandum for the selected removal action on February 14, 1997. The selected removal action (Alternative 3B, Moderate Excavation and Cap and Cover) includes excavation and off-site disposal of materials containing U-238 above 100 pCi/g or Th-232 above 15 pCi/g. Under Alternative 3B, soils with U-238 concentrations between 35 pCi/g and 100 pCi/g, would be consolidated to the west side of the Site, under an 18-inch gravel and earthen cap called the Designated Area (DA). The portion of the site not covered by the cap would be covered with six inches of clean soil, leaving the Site available for development for commercial, industrial, or recreational use. Alternative 3B was determined to be protective of human health and the environment, readily implementable, and cost-effective, while allowing a range of options for beneficial reuse for most of the Site.

Since the approval of the DOE Action Memorandum and initiation of the removal action, a change in the selection of removal actions has been deemed necessary due to:

- Uncertainties regarding the implementability of the DA,
- Physical constraints of the Site, and
- Local community resistance to Alternative 3B.

Considering the constraints on construction of the DA, Alternative 3B has been re-evaluated against another removal option (Alternative 2B, Large-scale Excavation and Disposal) that was

previously considered in the 1995 EE/CA. This re-evaluation included a streamlined risk assessment, an update of ARARs for radiological contaminants and selected metals, and updated cost estimates for Alternatives 2B and 3B. This re-evaluation was documented in a Technical Memorandum and the results were used to prepare this Action Memorandum. The proposed alternative and a summary of the cost estimates are included in Section II of this document.

Based on the results of this re-evaluation, Alternative 2B, the large-scale excavation and disposal removal alternative, is now proposed. Alternative 2B results in the removal and off-site disposal of soils with concentrations in excess of revised radiological and metals removal action goals and places an average of a two-foot clean soil cover over affected areas, leaving the Site available for development for commercial, industrial, or recreational use, as well as residential use. Soil would be excavated, packaged, transported and disposed of at one or more off-site facilities based upon its radiological and metals characteristics. Alternative 2B eliminates the need for the DA, and has been determined to be protective of human health and the environment, readily implementable, and cost-effective, while allowing a range of options for beneficial reuse of the Site.

The removal alternative selected in this Action Memorandum may be the final response action for soils at this site. If after completion of the selected alternative, the results of this response action are found to have been sufficient to remediate the soils at this site, the next procedural step for soils at this site would be a "no further action" Record of Decision. Therefore, barring any unforeseen facts, circumstances, or changed conditions, this Action Memorandum is expected to be the last document to be published proposing response alternatives for soils at this site, and the response action selected in this Action Memorandum is expected to be the last response action taken for soils at this site.

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

II. PROPOSED ACTION AND ESTIMATED COSTS

A. Proposed Action

1. Proposed action description

The proposed action is a modification of the one identified in the 1995 EE/CA as Alternative 2B – Large-Scale Excavation and Disposal. This alternative consists of the excavation and offsite disposal of soil and debris at the Site. Radiologically-impacted soil and debris exceeding cleanup goals would be removed from all depths and metals-impacted soil and debris exceeding cleanup goals would be removed from 0 - 9 ft below ground surface (bgs).

The proposed action will contribute positively to the overall remedial performance at the Site, because a large volume of soil containing contaminants of potential concern

(COPCs) will be removed. The proposed action will not impede future responses based on available information. By removing large soil volumes, the removal action will specifically address unacceptable risks to human health and the environment and will allow various beneficial reuses of the land.

Based on the results of the alternative re-evaluation, soils containing elevated levels of U-238, Th-232, Pb, Cu, and As would be excavated and removed for offsite disposal. Conventional construction equipment would be used in the excavation and loading operations. Radiologically-impacted excavated soils would be transported to the disposal facilities by rail. Facilities previously constructed at the site would be used to load the soil into rail cars. Excavated soils containing less than 170 pCi/g U-238 and less than 54.5 pCi/g Th-232 may be disposed of at RCRA-permitted facilities. Excavated soils containing in excess of these limits would be disposed of at a low-level radioactive waste facility. Excavated soils that meet the radiological removal action goals, but not the removal action goals for metals may be transported by rail and/or truck to a permitted waste landfill.

The rail cars and trucks used to transport site materials to the disposal facilities would be inspected for safety before use. The exteriors of containers and vehicles would be checked and decontaminated, if necessary. Shipments would be manifested according to applicable requirements for hazardous materials. Pre-designated routes would be traveled and an emergency response program would be established for responding to accidents. The transportation of soils from the Site would comply with applicable state and federal regulations.

Following receipt of acceptable confirmation results, excavated areas would be backfilled and restored. Certified clean fill material would be obtained from outside sources and be placed and compacted in the excavated areas. The fill would be placed to restore the existing topography and graded to promote drainage. Due to the extensive excavation required, the Site will be backfilled to grade, with an average of two feet of soil over the remediated areas, with most areas requiring a greater backfill depth. Finally, the areas would be seeded to provide an erosion control cover.

It should be noted that the proposed action is applicable only to the Site (i.e., the CISS and the Town of Colonie property within the CISS). The Niagara Mohawk and CSX properties identified in the 1995 EE/CA, as well as the groundwater at the entire site, will be addressed in separate Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) actions.

2. Engineering Evaluation/Cost Analysis (EE/CA)

Two comprehensive EE/CAs have been completed, one for the site buildings in 1993, and the other for the soils in 1995. In addition, a Technical Memorandum has been prepared to support this Action Memorandum.

The objective of the Technical Memorandum was to ensure that the response action selected in the DOE Action Memorandum is protective of human health and the environment by re-evaluating Alternatives 2B, Large-Scale Excavation of Radiological and Hazardous Metal Materials, and 3B, Moderate Excavation, Offsite Disposal of Radioactive Soil, and Cap and Cover from the 1995 EE/CA.

Preparation of the Technical Memorandum involved: reviewing previous reports and investigations; identifying new site data and work that has been completed since issuance of the 1995 EE/CA; performing a streamlined risk evaluation and updating applicable or relevant and appropriate requirements (ARARS); evaluating and analyzing the two removal action alternatives, including performing a cost analysis and comparing the removal alternatives against the nine CERCLA criteria; and identifying a preferred option based on the analysis.

As part of the ARARs analysis and risk assessment tasks, three on-site usage scenarios (Resident Farmer, Urban Resident and Industrial Worker) were evaluated to develop site-specific removal action goals. The Urban Resident and Industrial Worker Scenarios did not include use of groundwater, so a fourth scenario, Off-Site Drinking Water Receptor, was also evaluated to determine whether protection of off-site groundwater would be the limiting factor in determining cleanup goals for the on-site scenarios. Because off-site groundwater is a limiting factor, it was concluded that the Urban Resident scenario was the most representative scenario of the future use of the site, and that scenario was used in setting the removal action goals where ARARs were not available.

3. ARARs and removal action goals

Analysis of potential ARARs in the Technical Memorandum resulted in the identification of the following ARARs that pertain to Alternative 2B:

- Radiological criteria for unrestricted use (10 CFR 20.1402) (chemical-specific).
- Treatment standards (40 CFR 268.40, 268.48, and 268.49) (action-specific).
- SPDES substantive requirements (6 NYCRR Parts 754.1, 754.2, 754.4, 756.1, 756.2, and 756.3) (action-specific).

A more thorough discussion of ARARs is provided in the Technical Memorandum.

Site cleanup criteria identified in the 1995 EE/CA are: 1) U-238 concentration of 35 pCi/g when averaged over a 5 cm soil depth; 2) thorium concentration of 5 pCi/g averaged over 100 m^2 area for the surface 15 cm of soil, and 15 pCi/g averaged over 15 cm thick layers of soil more than 15 cm below the surface; and 3) 500 ppm of lead in soil.

The cleanup criteria for the usage scenarios evaluated in the Technical Memorandum are summarized in Table 1.

For the most likely future use scenario (Urban Resident), the risk analysis shows that the cleanup levels in Table 1 are protective of human health and the environment. As shown in that table, U-238 at a level of 110 pCi/g would be protective, however, to meet previous DOE commitments, a 35 pCi/g cleanup level for U-238 is recommended (Table 2). The selection of the more conservative U-238 criteria has a minimal effect on the total volume of waste (approximately 5%) and total project cost (less than 5%). Using a dose-based methodology, the risk analysis showed that the Th-232, Pb total and Cu total cleanup levels should be 2.8 pCi/g, 450 mg/kg, and 1,912 mg/kg, respectively. For As total, the regional soil background concentration (7.4 mg/kg) is recommended as the cleanup goal.

The recommended soil cleanup goals, therefore, are:

- 35 pCi/g for U-238
- 2.8 pCi/g for Th-232
- 450 mg/kg for Pb total
- 1,912 mg/kg for Cu total
- 7.4 mg/kg for As total

Table 1

Summary of Cleanup Criteria for Land Use Scenarios

Contaminant	Resident Farmer	Urban Resident	Industrial Worker	Off-site Groundwater
U-238 (pCi/g)[2]	37	1,373 110[1]	4,024 110[1]	110
Th-232 (pCi/g)[2]	1.5	2.8	7.6	N/A
Pb total (mg/kg)	37	450	1,219	N/A
Cu total (mg/kg)	194	1,912	51,150 9,457[1]	9,457
As total (mg/kg)	7.4	7.4	7.4	N/A

[1]Protection of off-site groundwater is the controlling factor in determining cleanup criteria for this scenario.

[2]Cleanup goals represent values in excess of background.

Radiologically-impacted soil (i.e., soil with more than 35 pCi/g for U-238 or 2.8 pCi/g for Th-232) would be removed regardless of depth. Other metals-impacted soil

would be removed only if present between 0-9 ft below ground surface (bgs). Metals-impacted soil below 9 ft would not be removed, since there is no complete exposure pathway and leaving that soil in place would be protective of human health and the environment. Final grading of the Site will result in an average of 2 ft of clean fill being placed over the excavated areas of the Site.

The Technical Memorandum recommends Alternative 2B, Large-Scale Excavation and Disposal, as the response action for radiological and chemically-impacted soils at the Site. This alternative meets all of the criteria used to evaluate the alternatives. Alternative 2B involves standard construction technologies with a proven successful application at the Site over the past several years.

Alternative 2B is recommended over Alternative 3B because impacted soils are removed from the Site and long-term storage of soil onsite within the DA is not a component of this action. As a result, Alternative 2B provides greater long-term effectiveness and permanence, greater short-term effectiveness, and greater ease of implementation in comparison to Alternative 3B. Alternative 2B also offers the advantage of a wider range of potential future uses for the Site. Finally, Alternative 2B presents the best possibility for acceptance by the citizens of Colonie and the surrounding area.

Table 2

Comparison of DOE Criteria vs. USACE Selected Criteria

Contaminant	1995 DOE Criteria [1]	Selected Cleanup Criteria [2]
U-238 (pCi/g)[3]	35	35
Th-232 (pCi/g)[3]	15	2.8
Pb total (mg/kg)	500	450
Cu total (mg/kg)	10,000	1,912
As total (mg/kg)	N/A	7.4

[1]The DOE goals are based on a mixture of residential and industrial/commercial land use.

[2]The USACE cleanup goals are based on urban residential land use.

[3]Cleanup goals represent values in excess of background.

B. Estimated Costs

Table 3 provides an estimate of costs associated with implementing Alternatives 2B and 3B. The costs are for the soil removal action only. The summary does not include costs associated with groundwater investigation, monitoring and remedial action or with proposed activities at the CSX and Niagara Mohawk properties, neither of which is part of this removal action. A detailed cost estimate is currently being prepared to determine the total cost to complete the entire remediation project.

Table 3

Summary of Cost Estimates for the Site Soil Removal Action

Item	Alternative	
	2B	3B
Direct Construction Cost	$16,588,000	$11,356,000
Indirect Construction Cost	$2,296,000	$2,588,000
Total Construction Cost	$18,884,000	$13,944,000
Post-Closure Activities (Present Worth)	$876,000	$1,266,000
Total Cost	$19,760,000	$15,210,000

III. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Delayed or no action at the Site would permit uranium, thorium, and metals from contaminated soil to potentially migrate to groundwater and the environment, resulting in exposure to workers and possibly members of the general public.

IV. OUTSTANDING POLICY ISSUES

None.

V. PUBLIC NOTIFICATION

The Technical Memorandum and this Proposed Action Memorandum can be found in the Administrative Record file maintained at the Site, and in the information repository at the William K. Sanford Town Library located on Albany-Shaker Road. The notice of the availability of these two documents was published in the Albany Times Union on June 18, 2001, and contained a request for public comments on the Proposed Action Memorandum. [*The 30-day public comment period extends through July 17, 2001. In addition, a public meeting is to be held on July 11, 2001, to present the Proposed Action Memorandum. USACE representatives will answer questions about the removal action alternative now being proposed. Responses to*

the comments received during the comment period will be included in the revised Action Memorandum, which will then be signed and placed in the Administrative Record.]

VI. RECOMMENDATION

This decision document represents the revised Removal Action for soil contaminated with metals and radiological material at the Site in Colonie NY. This decision document was developed in accordance with CERCLA, as amended, and is not inconsistent with the NCP. This action is based on the Administrative Record for the Site.

Conditions at the Site continue to meet the criteria set forth in Section 300.415 of the NCP for a Removal Action. I approve the selection of Alternative 2B as the Removal Action at the Site.

APPROVED: _____ DATE: _____

M. Stephen Rhoades
Brigadier General, U.S. Army
Division Engineer

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Final
Technical Memorandum in Support of a Proposed Action Memorandum

Colonie Site
Colonie, NY

Prepared by the U.S. Army Corps of Engineers
Formerly Utilized Sites Remedial Action Program

1 June 2001

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ACRONYMS AND SYMBOLS

1,2-DCE	1,2-dichloroethene
AEC	Atomic Energy Commission
AM	Action Memorandum
ANL	Argonne National Laboratory
ARAR	Applicable or Relevant and Appropriate Requirement
BNAE	Base Neutral Acid Extractable
BNI	Bechtel National, Inc.
CDC	Centers for Disease Control and Prevention
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CISS	Colonie Interim Storage Site
CMB	Chemical Management Building
COC	Contaminant of Concern
COPCs	Chemicals of Potential Concern
CONRAIL	Consolidated Rail Company (CSX)
cpm	counts per minute
CSF	Cancer Slope Factors
cy	cubic yards
DA	Designated Area
DOE	Department of Energy
DOT	Department of Transportation
EE/CA	Engineering Evaluation and Cost Analysis
EPA	Environmental Protection Agency

FIDLER	Field Instrument for Detecting Low Energy Radiation
FUSRAP	Formerly Utilized Sites Remedial Action Program
GSD	Geometric Standard Deviation
HMTA	Hazardous Management Transportation Act
HTRW	Hazardous, Toxic, and Radioactive Waste
IEUBK	Integrated Exposure Uptake Biokinetic
Kd	Distribution Coefficient
LARM	Low Activity Radiological Material
LDR	Land Disposal Restriction
LLRW	Low-Level Radioactive Waste
LNAPL	Light Non-Aqueous Phase Liquid
NAAQS	National Ambient Air Quality Standards
NCP	National Contingency Plan
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NiMo	Niagara Mohawk Power Corporation
NL	National Lead
NMSS	Nuclear Material Safeguards and Security
NPDES	National Pollution Discharge Elimination System
NRC	Nuclear Regulatory Commission
NYSDEC	New York State Department of Environmental Conservation
ORNL	Oak Ridge National Laboratory
OSHA	Occupational Safety and Health Administration
Pb	Lead
PCE	tetrachloroethene (perchlorethene)

pCi/g	Picocuries per gram
Ra-226	Radium-226
RBC	Risk Based Concentration
RBSC	Risk Based Screening Concentration
RCRA	Resource Conservation and Recovery Act
RfD	Reference Dose
SAP	Sampling and Analysis Plan
SNM	Special Nuclear Material
SPDES	State Pollutant Discharge Elimination System
SRP	Standard Review Plan
TBC	To Be Considered
TCE	trichloroethene
TCLP	Toxicity Characteristic Leaching Procedure
TEDE	Total Effective Dose Equivalent
TERC	Total Environmental Restoration Contract
Th-232	Thorium-232
THQ	Target Hazard Quotient
TR	Target Cancer Risk
TWG	Technical Work Group
U-238	Uranium-238
USACE	U.S. Army Corps of Engineers
UTS	Universal Treatment Standard
VOCs	Volatile Organic Compounds

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1. SUMMARY

By Congressional action, the U.S. Army Corps of Engineers (USACE) was designated on October 13, 1997 to execute the Formerly Utilized Sites Remedial Action Program (FUSRAP). FUSRAP was established by the Department of Energy (DOE) to identify, investigate, and clean up or implement institutional controls of sites where contamination above current guidelines remains from the early years of the nation's atomic energy program.

The Colonie Site (the Site) is a FUSRAP site located in the Town of Colonie, Albany County, New York. The Colonie Site consists of the Colonie Interim Storage Site (CISS), owned by the DOE, and the Town of Colonie vicinity property.

The purpose of this Technical Memorandum is to develop the technical basis for revising the 1997 Action Memorandum (AM) (DOE, 1997) applicable to the Site. The 1997 AM was prepared based on results of an Engineering Evaluation and Cost Analysis (EE/CA) performed for the Site in 1995 (DOE, 1995a). Soil is the only medium addressed under this action; groundwater will be addressed under a separate CERCLA action.

The objective of this Technical Memorandum is to ensure that selected remedies are protective of human health and the environment. To that end, this Technical Memorandum re-evaluates Alternatives 2B, Large-Scale Excavation of Radiological and Hazardous Metal Materials, and 3B, Moderate Excavation, Off-Site Disposal of Radioactive Soil, and Cap and Cover from the 1995 EE/CA. The 1997 AM selected Alternative 3B. Due to uncertainties regarding the implementability of Alternative 3B, in addition to strong local community resistance, USACE decided to explore whether another alternative presented in the 1995 EE/CA might be a more-effective choice for the response action at the Site. This Technical Memorandum provides the evaluation and analysis needed to support any revisions to the 1997 AM.

Work involved in preparing this Technical Memorandum included the following: reviewing previous reports and investigations; identifying new site data and work that has been completed since issuance of the 1995 EE/CA; performing a streamlined risk evaluation and updating applicable or relevant and appropriate requirements (ARARs) for contaminants of concern (uranium [U-238], thorium [Th-232], lead [Pb], copper [Cu], and arsenic [As]); evaluating and analyzing the removal action alternatives, including performing a cost analysis and comparing the removal alternatives against the nine Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) criteria; and identifying a preferred option based on the analysis. Consideration was also given to radium; however, its presence was noted in the same locations as the uranium and thorium, and, therefore, was not carried further as a contaminant of concern.

Since the 1995 EE/CA was issued, actions delineated in a 1993 EE/CA, prepared to support on-site building removal, have been completed, including the following: removal and disposal of mixed radioactive and chemical waste previously stored at the main building in accordance with a Resource Conservation and Recovery Act (RCRA) Part A permit application and closure of the building as a RCRA interim waste storage area; removal and disposal of asbestos-containing materials; removal of equipment and nonstructural building appurtenances; and building

housekeeping, including vacuuming. The main building was also used to store drums of mixed radioactive and hazardous waste. These drums contained waste from former operations and from previous cleanup activities. This material has since been properly disposed.

In early 1999, work plans were prepared for restoration of the Site. Phases of the site restoration task included the following: disposal of material stockpiles; and excavation, treatment, and off-site disposal of contaminated materials.

Lead stabilization at the Site was initiated in October 1999. An on-site temporary groundwater treatment system was designed, permitted, and constructed to manage water collected from excavations and decontamination operations.

The updated ARAR assessment in this Technical Memorandum identifies Nuclear Regulatory Commission (NRC) regulations specified in 10 CFR 20, Subpart E, Radiological Criteria for License Termination, as being relevant and appropriate to the uranium and thorium contamination in the soil at the Site. To convert that regulation's dose-based criteria into pCi/g, a streamlined risk assessment was performed using current NRC guidance documents and the RESRAD computer code. A limited sensitivity analysis was conducted on some key model parameters, and site-specific data were identified for use in the model. Three on-site usage scenarios were evaluated: Resident Farmer, Urban Resident, and Industrial Worker. The Urban Resident and Industrial Worker scenarios did not include use of groundwater so a fourth scenario, Off-Site Drinking Water Receptor, was also evaluated to determine whether protection of off-site groundwater would be a limiting factor in determining cleanup goals for on-site soils.

Based on the characterization investigations performed at the Site, uranium, thorium, lead, and copper are the contaminants present above the cleanup goals at the highest concentrations and greatest extent in the soil, and are therefore the drivers of the response action. RESRAD was used to estimate on-site cleanup goals for uranium and thorium for all three on-site scenarios. The U.S. Environmental Protection Agency's (EPA) Integrated Exposure Uptake Biokinetic (IEUBK) and Adult Lead models were used to determine lead cleanup goals. For copper, algorithms based on EPA methodology were used to calculate recommended cleanup goals (*Soil Screening Level Guidance* [EPA, 1996b], *Risk Assessment Guidance for Superfund* [RAGS; EPA, 1989c], and *Human Health Risk Assessment Protocol for Hazardous Waste Combustions* [EPA, 1998]). For these contaminants, off-site groundwater impacts were also evaluated using Appendix K of the RESRAD manual and/or the DOMENICO computer code. Exposure to on-site soils is the controlling factor in determining soil cleanup goals for non-radiological contaminants and thorium in the Resident Farmer and Urban Resident scenarios. However, protection of off-site groundwater (soil-to-groundwater leaching impacting the Off-Site Drinking Water Receptor) is the controlling factor for determining soil cleanup goals for uranium for the Urban Resident and Industrial Worker scenarios, and for copper for the Industrial Worker scenario. For the remaining primary contaminant (arsenic), the cleanup goal was based on regional background soil concentrations (Shaklette and Boerngen, 1984). The cleanup goals are summarized in Tables 1-1 and 1-2.

Table 1-1

Summary of Cleanup Goals for Land Use Scenarios

Contaminant	Resident Farmer	Urban Resident	Industrial Worker	Off-Site Groundwater
U-238 (pCi/g)[1]	37	1,373 110[2]	4,024 110[2]	110
Th-232 (pCi/g)[1]	1.5	2.8	7.6	N/A
Pb total (mg/kg)	37	450	1,219	N/A
Cu total (mg/kg)	194	1,912	51,150 9,457[2]	9,457
As total (mg/kg)	7.4	7.4	7.4	N/A

[1]Cleanup goals represent values in excess of background.

[2]Protection of off-site groundwater is the controlling factor in determining cleanup goals for this scenario.

Table 1-2

Comparison of DOE Goals vs. USACE Selected Goals

Contaminant	1995 DOE Goals[1]	Selected Cleanup Goals[2]
U-238 (pCi/g)[3]	35	35
Th-232 (pCi/g)[3]	15	2.8
Pb total (mg/kg)	500	450
Cu total (mg/kg)	10,000	1,912
As total (mg/kg)	N/A	7.4

[1]The DOE goals are based on a mixture of residential and industrial/commercial land use.

[2]The USACE cleanup goals are based on urban residential land use.

[3]Cleanup goals represent values in excess of background.

For the most likely future use scenario (Urban Resident), the risk analysis shows that the cleanup levels in Table 1-1 are protective of human health and the environment. As shown in that table, U-238 at a level of 110 pCi/g would be protective; however, to meet the previous DOE commitments, a 35 pCi/g cleanup level for U-238 is recommended (Table 1-2). Using a dose-based methodology, the risk analysis showed that the Th-232, Pb total, and Cu total cleanup levels should be 2.8 pCi/g, 450 mg/kg, and 1,912 mg/kg, respectively. The regional soil background concentration for As total is 7.4 mg/kg.

The recommended soil cleanup goals, therefore, are:

- 35 pCi/g for U-238
- 2.8 pCi/g for Th-232
- 450 mg/kg for Pb total
- 1,912 mg/kg for Cu total
- 7.4 mg/kg for As total

The radiological cleanup goals were calculated as average concentrations for the Site. As described in MARSSIM, after remediation is completed, small areas of the Site may have concentrations of these contaminants in excess of these cleanup goals. Allowable maximum concentrations and volumes over which concentrations may be averaged will be specified in the Final Status Survey Plan for the Site.

Radiologically impacted soil (i.e., soil with more than 35 pCi/g for U-238 or 2.8 pCi/g for Th-232) would be removed regardless of depth. Other metals-impacted soil would be removed only if present between 0-9 ft below ground surface (bgs). Mixing of deep soils for dilution of contamination with cleaner near surface soils was not considered. Metals-impacted soil below 9 ft would not be removed, since there is no complete exposure pathway. Final grading of the Site will result in an average of 2 ft of clean fill being placed over the excavated areas of the Site.

This Technical Memorandum recommends Alternative 2B, Large-Scale Excavation and Disposal, as the response action alternative for radiological and chemically impacted soils at the Site. This alternative meets all of the criteria used to evaluate the alternatives. Alternative 2B involves standard construction technologies with a proven successful application at the Site over the past several years.

Alternative 2B is recommended over Alternative 3B because impacted soils are removed from the Site and long-term storage of soil on-site within the Designated Area (DA) is not a component of this action. As a result, Alternative 2B provides greater long-term effectiveness and permanence, greater short-term effectiveness, and greater ease of implementation in comparison to Alternative 3B. Alternative 2B also offers the advantage of a wider range of potential future uses for the Site. Finally, Alternative 2B presents the best possibility for acceptance by the citizens of Colonie and the surrounding area.

2. INTRODUCTION

By Congressional action, the U.S. Army Corps of Engineers (USACE) was designated on October 13, 1997 to execute the Formerly Utilized Sites Remedial Action Program (FUSRAP). FUSRAP was established by the Department of Energy (DOE) to identify, investigate, and clean up or implement institutional controls of sites where contamination above current guidelines remains from the early years of the nation's atomic energy program.

The Colonie Site is located in the Town of Colonie, Albany County, New York. It should be noted that this Technical Memorandum is applicable only to the Colonie Site, which includes the CISS and the Town of Colonie vicinity property. The Niagara Mohawk and CSX properties will be addressed under a separate CERCLA action. Additionally, soil is the only medium addressed under this action; groundwater will be addressed under a separate CERCLA action.

This Technical Memorandum supports fulfillment of the CERCLA requirements for the documentation of the cleanup selection process. The USACE follows the CERCLA process for review of actions to ensure that environmental protection controls and opportunities for public involvement are incorporated into the decision-making process. This Technical Memorandum's goal is to recommend an alternative that is feasible, protective of human health and the environment, and allows beneficial re-use of the Site.

2.1 PURPOSE OF TECHNICAL MEMORANDUM

The purpose of this Technical Memorandum is to ensure that selected remedies are protective of human health and the environment. To that end, this Technical Memorandum re-evaluates Alternatives 2B, Large-Scale Excavation of Radiological and Hazardous Metal Materials, and 3B, Moderate Excavation, Off-Site Disposal of Radioactive Soil, and Cap and Cover from the 1995 EE/CA. The 1997 AM selected Alternative 3B. Due to uncertainties regarding the implementability of Alternative 3B, in addition to strong local community resistance, USACE decided to explore whether another alternative presented in the 1995 EE/CA might be a more effective choice for the response action at the Site. This Technical Memorandum provides the evaluation and analysis needed to support any revisions to the 1997 AM.

Work involved in preparing this Technical Memorandum included the following: reviewing previous reports and investigations; identifying new site data and work that has been completed since issuance of the 1995 EE/CA; performing a streamlined risk evaluation and updating ARARs for contaminants of concern (uranium [U-238], thorium [Th-232], lead [Pb], copper [Cu], and arsenic [As]); and re-evaluating and analyzing Alternatives 2B and 3B, including performing a cost analysis and comparing the alternatives against the nine CERCLA criteria; and identifying a preferred option based on the analysis. Consideration was also given to radium; however, its presence was noted in the same locations as the uranium and thorium, and, therefore, was not carried further as a contaminant of concern.

2.1.1 Memorandum Structure

This memorandum is organized as follows. Each section begins with the text describing the subject matter at hand. Figures, tables, data output files, and other applicable information too voluminous to appear in the main body of the memorandum are appended to the document.

2.2 SITE BACKGROUND

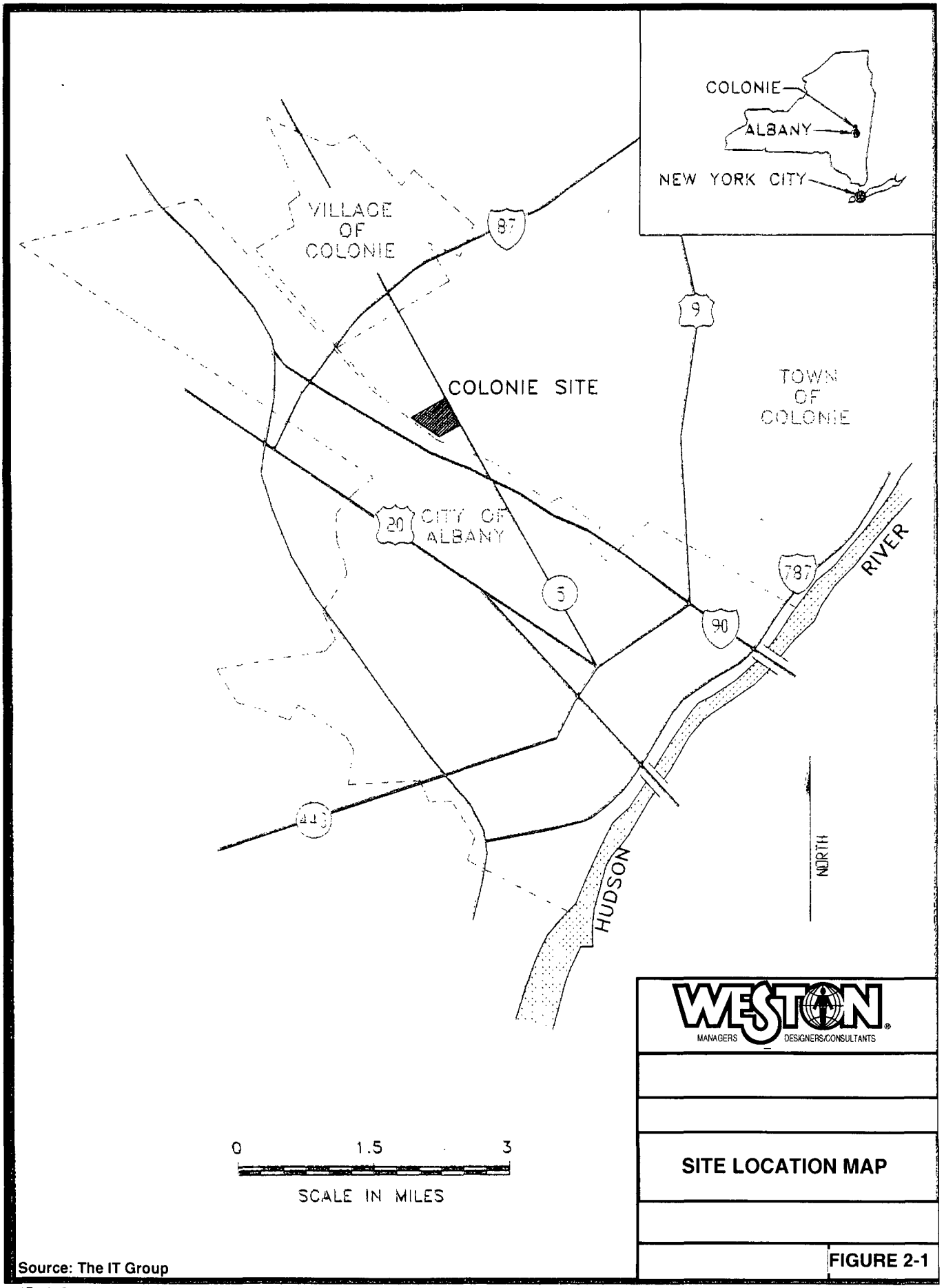
2.2.1 Site Description

The Site is located at 1130 Central Avenue (State Route 5) in the Town of Colonie, Albany County, New York, approximately 6.4 kilometers northwest of downtown Albany. A site location map is presented in Figure 2-1. The boundary line between the Town of Colonie and the City of Albany is located just south of the Site. The Town of Colonie also owns a small portion of land bordered on two sides by the CISS, which is part of the Site covered by this Technical Memorandum. Its location is shown in Figure 2-2. Elevation of the property ranges from about 70 meters above mean sea level on the southwest end to a low point of about 65 meters on the northwest side, where a drainage channel enters the property. The Site is bounded by a wooded lot on the northwest, CSX (formerly Conrail) railroad tracks on the south, commercial property on the east, Central Avenue on the north, and a Niagara Mohawk electrical substation on the northwest. Significant features of the Site are shown in Figure 2-2.

The Site comprises about 11.2 acres, including the former National Lead (NL) Industries property; approximately 4 acres of paved surface; and approximately 1.6 acres of grassland. The slab of the main building previously covered about 3 acres in the central portion of the Site. Buildings covered approximately one-third of the Site. The main building was a warehouse-type facility consisting of five well-defined bay areas and several offices and other manufacturing support areas. A 1993 EE/CA (DOE, 1993a) addressed the management and disposition of the former NL Industries buildings located at the Site. Currently, activities associated with the removal of radiologically impacted soil are underway.

The Site was used for interim storage of radioactive waste materials removed from 53 vicinity properties. These properties were remediated in 1984, 1985, and 1988. The material found at the remediated sites was depleted uranium, and was typically concentrated in the upper five centimeters of soil. The 920 m^3 of waste soil generated during these remedial activities was held in interim storage within the Colonie Building. This material was bagged and shipped to a disposal facility in 1995. The building was also used to store drums of mixed radioactive and hazardous waste. These drums contained waste from former operations and from previous cleanup activities. This material was properly disposed of off-site.

A detailed site description, regarding ecology, surface water hydrology and wetlands, geology and soil, and hydrogeology and groundwater, can be found in the 1995 EE/CA (DOE, 1995a).



WESTON
MANAGERS DESIGNERS/CONSULTANTS

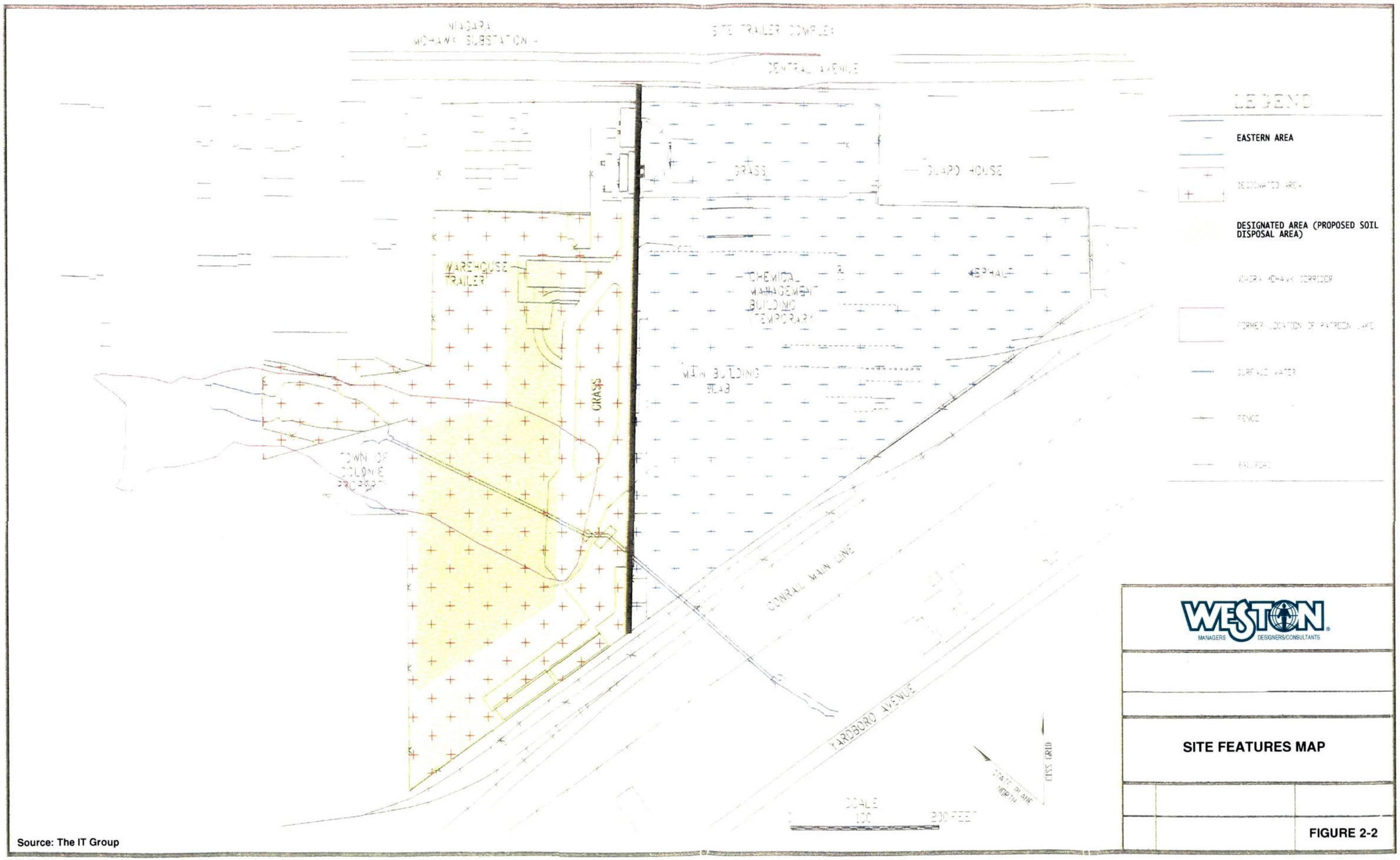
SITE LOCATION MAP

FIGURE 2-1

Source: The IT Group

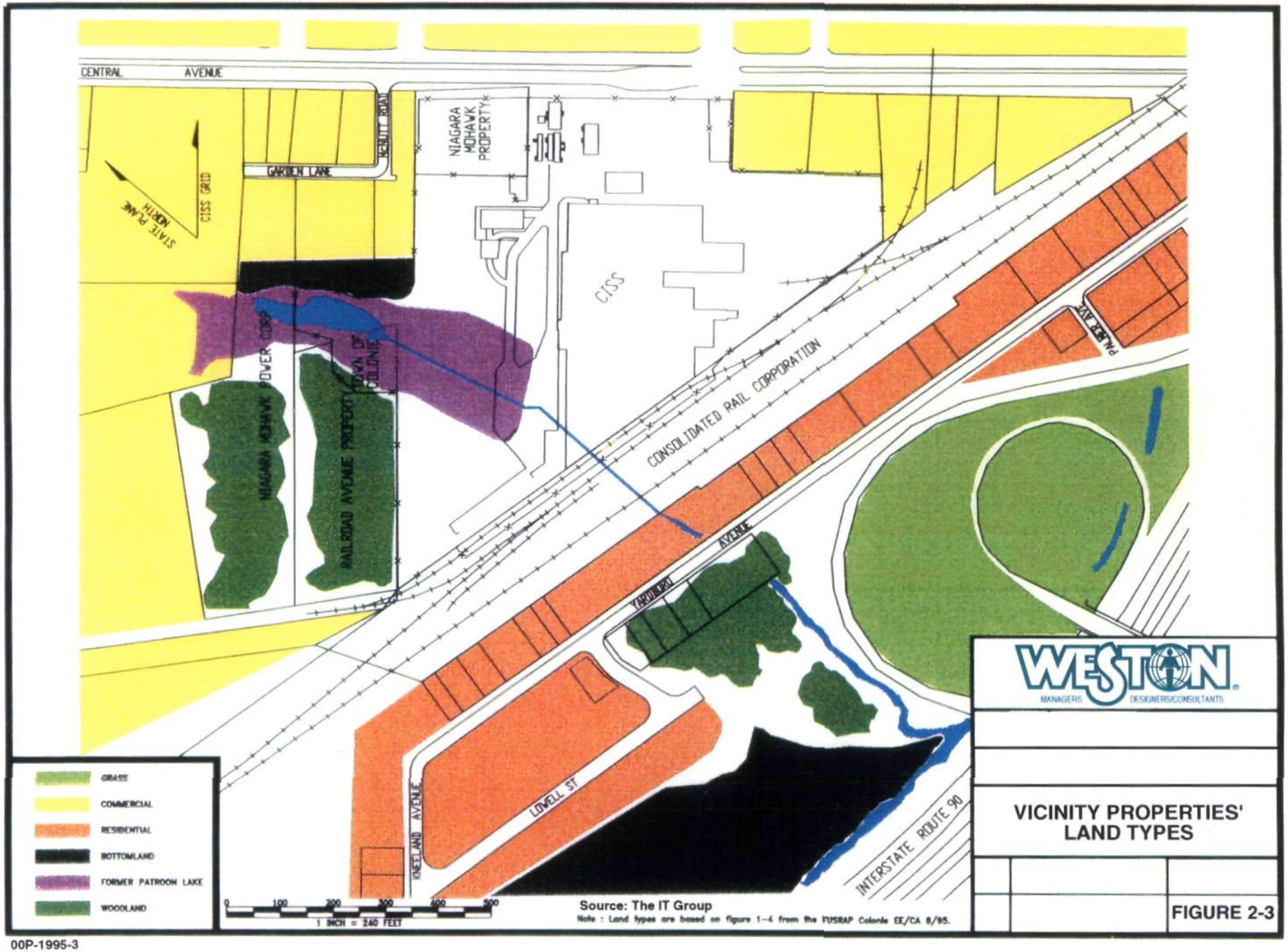
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Source: The IT Group

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CENTRAL AVENUE
GARDEN LANE
NIAGARA MOHAWK PROPERTY
CISS
CISS GRID
STATE PLANE NORTH
NIAGARA MOHAWK POWER CORP
RAILROAD AVENUE PROPERTY
TOWN OF COLONIE
CONSOLIDATED RAIL CORPORATION
PLEASANT AVE
WASHBURN AVENUE
OAKLAND AVENUE
LOWELL ST
INTERSTATE ROUTE 90
GRASS
COMMERCIAL
RESIDENTIAL
BOTTOMLAND
FORMER PATROON LAKE
WOODLAND
0 100 200 300 400 500
1 INCH = 240 FEET
Source: The IT Group
Note : Land types are based on figure 1-4 from the FUSRAP Colonie EE/CA 8/95.
WESTON
MANAGERS DESIGNERS/CONSULTANTS
VICINITY PROPERTIES' LAND TYPES
FIGURE 2-3

00P-1995-3

Uranium and lead were identified in the 1995 EE/CA as the most extensive and primary radiological and non-radiological constituents at the Site. Copper, thallium, and cadmium were also considered as contaminants of potential concern (COPC). The other non-radiological contaminants identified at the Site were largely associated with the copper- and lead-contaminated soils. Volatile organic compounds (VOCs) were found at locations distinct from the soils considered above and are being addressed under a separate CERCLA action.

Since the 1995 EE/CA was prepared, site buildings have been demolished, and the concrete from the building slab is being removed, crushed, and stockpiled on-site for possible re-use to make way for the remedial efforts on the underlying soil. Efforts have continued to operate and maintain the on-site soil processing and stabilization facility, and shipments of contaminated soil to Envirosafe Services of Idaho, Inc. (Envirosafe) hazardous waste processing and disposal facility in Owyhee County, Idaho, began in February 2000. Additional details on recent site operations are provided in Subsection 2.5.

2.2.2 Site History

Industrial operations at the Site began in 1923, when the Embossing Company purchased a portion of the present-day site to construct a facility for manufacturing wood products and toys. In 1927, Magnus Metal Company, Inc. purchased the property and converted the facility to a brass foundry for manufacturing railroad components. Magnus cast the brass components in sand molds and also manufactured brass bearing housings with surfaces of Babbitt metal (an alloy of lead, copper, and antimony). Preparation of the bearing surfaces for bonding with the brass housing involved degreasing of the bearings by immersion in an acid bath.

In 1937, NL Industries purchased the facility, continued the brass foundry operations initiated by Magnus, and bought an adjacent lot that contained a portion of Patroon Lake. At some point before 1941, NL Industries began filling Patroon Lake with used casting sand. After World War II, the plant began casting aluminum mainframes for jet airplanes. In 1958, the nuclear division of NL industries began producing items manufactured from uranium and thorium under a license issued by the Atomic Energy Commission (AEC). NL Industries discontinued its brass foundry operations in 1960.

Between 1958 and 1984, NL Industries carried out a number of processes using radioactive materials consisting primarily of depleted uranium, but also with lesser amounts of thorium and enriched uranium. The plant handled enriched uranium from 1960 to 1972. From 1966 to 1972, NL Industries held several contracts to manufacture fuel from enriched uranium for experimental nuclear reactors. Operations at the plant reduced depleted uranium tetrafluoride to depleted uranium metal, which was then fabricated into shielding components, ballast weights, and projectiles. During this period, the AEC issued licenses to NL Industries for possession of uranium and special nuclear material, and the State of New York issued a license for fabrication of depleted uranium parts. As a result of NL Industries' operations, residual radioactive materials were found at the site buildings, grounds, and surrounding residences and businesses.

Other processes conducted at the plant included an electropolishing operation for plating uranium with nickel and cadmium. Chemicals used in the plating operation included nickel

sulfamate, sodium cyanide, ferric chloride, nitric acid, silicate phosphate, iridite (a chromium brightener), cadmium metal, nickel metal, boric acid, and tetrachlorethene. The location and method of disposal for most of these materials is unknown, because very few disposal records could be located; however, NL Industries' letters indicate that, under an AEC license, approximately 42 m^3 of graphite, slag, refractory uranium oxide, insoluble oil, metal scrap, and burnable trash were buried in the Patroon Lake area by 1961 (Huss, 1959; Wilson, 1962). Chemical wastes and packaged chemicals used at the Site included acids, bases, degreasing agents, carbon tetrachloride, benzene, polychlorinated biphenyls, cyanide, heavy metals, and asbestos. The chemicals present on the Resource Conservation and Recovery Act (RCRA) Part A permit application were removed from the Site as part of the closure of the Site as an interim RCRA storage facility.

On February 15, 1980, the New York State Supreme Court issued a temporary restraining order barring NL Industries from operating its facility because it emitted unacceptable airborne releases of uranium compounds. The temporary restraining order was amended on May 12, 1980 to allow NL Industries to continue limited operations. The amended order required the company to initiate an independent investigation to assess all adverse environmental conditions in on-site soil and on the affected residences and businesses that may have been caused by airborne discharges of radioactive particulates from the plant.

New York State Officials closed NL in 1984, and Congress authorized DOE to remediate the property. In February 1984, the Secretary of Energy accepted an offer from NL Industries to donate the land, buildings, and equipment to DOE to help expedite the cleanup. In 1985, DOE acquired a portion of the Niagara Mohawk property bordering the Site to the north and northwest, and subsequently designated it as part of the Site. From 1984 to 1995, the Site was used for interim storage of radioactive materials removed from the affected properties and businesses (DOE, 1986a) (DOE, 1989a).

At the time DOE took ownership of the former NL Industries property, both the AEC and State licenses were administratively terminated, since DOE-owned facilities are not subject to regulation by the Nuclear Regulatory Commission (NRC) successor licensing agency to AEC, or the State.

In 1992, the DOE initiated actions to prepare the main Site Building for remediation, including preparation of an EE/CA (DOE, 1993a). In September 1995 (DOE, 1995a), an EE/CA to address remediation of the Site was finalized. Following approval of the EE/CA, the 1997 AM, designating Alternative 3B from the EE/CA as the selected removal alternative, was issued. Subsequent activities have included the dismantling of all facility buildings and initiation of excavation as part of the 1997 AM.

2.2.3 Land Use

The Site is situated in an urban area consisting of both residential and commercial properties, located in the Industrial F zoning district. The definition of the Industrial F district states that prohibited uses include "any use which produces radiation, light, smoke, fumes, or odors of a

noxious or harmful nature carrying beyond the limits of the premises." Figure 2-3 (from the 1995 EE/CA) shows the land use in the area immediately surrounding the Site. Current land use is somewhat more residential, which is supported by a description of the Site as being, "...in the heart of a dense mix of residential and business properties" (Town of Colonie letter to CENAD, June 29, 2000). Population estimates indicate that there were 82,638 people living in the Town of Colonie in 1998 (Town of Colonie Website, 2001) and 292,006 persons living in Albany County in 1999 (U.S. Census Bureau, 2000).

While it is impossible to positively predict the future land use at the Site, it is reasonable to consider urban residential as the most probable future use. In accordance with EPA guidance for selecting a site's potential future land use, current land use, site setting, zoning laws/maps, and comprehensive community master plans were examined. The Town's master plan indicating future commercial use for the Central Avenue strip, coupled with the fact that residential property currently borders the site on two sides, supports the proposition that cleanup criteria should be urban residential. Future projected use will result in concentrated mixed use development with high population characteristic of an urban residential scheme.

Homes and businesses in the area around the Site are provided with public water from the Latham Water District in the Town of Colonie. The water sources are the Mohawk River, several wells, and several reservoirs. A well canvass of the area within a 3-mile radius of the Site, conducted in 1987 and 1988, yielded records for eight wells drilled between 1965 and 1987; six of these wells supplied water for industrial use, but also reportedly yielded water suitable for drinking. One of the other two wells was used mainly for domestic purposes and irrigation, but reportedly also yielded water suitable for drinking. The remaining well supplied water primarily for industrial use, but reportedly also yielded water suitable for drinking. No public water supply wells were found within the canvass area.

2.3 PREVIOUS INVESTIGATIONS

As early as 1978, Atcor, Inc. performed a radiological survey at the Site for the purpose of assessing plant conditions and making recommendations regarding corrective measures that could be taken (Atcor 1978). In 1980, NL Industries contracted Teledyne Isotopes to perform a radiological survey of the facility and the area surrounding the facility. In 1980 and 1981, Teledyne Isotopes conducted additional radiological surveys of the property (TI, 1980) (TI, 1981). The objective of the 1980 survey was to determine the extent of surface soil radiation on the Site and its vicinity properties as a result of stack emissions. The 1981 survey focused on determining the extent of subsurface radioactivity contamination.

In 1981, Oak Ridge National Laboratory (ORNL) published background activity levels for uranium-238 (U-238), radium-226 (Ra-226), and thorium-232 (Th-232) (ORNL, 1981) in NY State. Investigations performed by ORNL define average soil and sediment background activity levels for the State of New York as approximately 1.0 pCi/g for U-238, 0.9 pCi/g for Ra-226, and 0.7 pCi/g for Th-232.

In 1984, DOE was given responsibility for managing cleanup activities at the Site. DOE conducted a geological and hydrogeological investigation that included drilling and soil

sampling for stratigraphic characterization, field permeability tests, and geotechnical analysis. Seven monitoring wells were also installed to observe groundwater behavior and to supplement information from existing wells in the groundwater monitoring program.

In 1984, DOE also initiated a routine environmental monitoring program, which has continued in various forms until the present. The DOE program initially included groundwater monitoring from six on-site and four off-site wells. As the project has progressed, several wells have been added and the mix of wells sampled during any individual sampling event has varied based on well condition, data needs, and other factors. The monitoring program ceased in 1997, but was resumed in 1998 by USACE.

In 1984, DOE prepared an Action Memorandum for removal of soil from vicinity properties (ANL, 1984). Between 1984 and 1988, DOE removed approximately 950 m^3 of radioactive soil from 53 of the vicinity properties (DOE, 1986c; 1989b). The removed soil was placed under a synthetic cover and stored in the CISS Building. This soil was later placed in bags and was shipped to a long-term storage facility (DOE, 1986a).

In 1988, DOE conducted a radiological designation survey of the Conrail property (ORNL, 1988), which resulted in this property being added to the Colonie project.

The CERCLA process was initiated to implement remedial work at the Site. The scoping/planning phase was completed in 1990 (DOE, 1990a and DOE, 1990b), and characterization of the site was completed in 1992 (DOE, 1992b). BNI conducted additional characterization studies involving soil-gas, soil, sediment, surface water, and groundwater sampling, in addition to estimating the volume of impacted soil to be addressed at the Site. Eleven additional groundwater monitoring wells were installed during the characterization.

In 1992, the DOE initiated actions to prepare the main CISS Building for remediation, including preparation of an EE/CA (DOE, 1993a). These actions included: removal and disposal of mixed radioactive and chemical waste previously stored at the building in accordance with a RCRA Part A permit application and closure of the building as a RCRA interim waste storage area (DOE, 1992c); removal and disposal of asbestos-containing materials; removal of equipment and nonstructural building appurtenances; and building housekeeping, including vacuuming.

The DOE initiated actions to prepare for remediation of soil at the Site and the three remaining vicinity properties, including preparation of an EE/CA, which cover the CISS and these vicinity properties (DOE, 1995a).

2.4 1995 DOE EE/CA

In 1995, DOE prepared an EE/CA to assess potential removal action alternatives for the Site, evaluated each alternative against applicable CERCLA criteria, and made recommendations on the selection of an optimal removal action alternative. The 1995 EE/CA is the most recent EE/CA completed and issued for the Site.

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2.4.1 DOE Selected Remedy

In the 1997 AM, which was based on the 1995 EE/CA, the DOE selected Alternative 3B as the remedy for the Site. This alternative, titled, "Moderate Excavation, Off-Site Disposal of Radioactive Soil, and Cap and Cover," involved the following:

- Excavating soils in excess of site radiological release goals (i.e., 35 pCi/g U-238, 15 pCi/g Th-232, and 15 pCi/g Ra-226).
- Storing soils containing concentrations of U-238 between 35 and 100 pCi/g in a constructed "Designated Area" (DA) on-site.
- Disposing of other excavated soils off-site.
- Covering soils below the release goals and soils consolidated within the DA.
- Implementing institutional controls to ensure that areas released for restricted use were maintained in accordance with required deed and other necessary land use restrictions.

2.5 POST-1995 REMOVAL ACTIONS

Since assuming responsibility for the Site in 1997, USACE has been implementing Alternative 3B. Key phases of current project work include: (1) the disposal of material stockpiles, chemicals, and debris; and (2) the excavation, treatment, and disposition of contaminated materials.

Material generated during previous removal actions had been stockpiled or was already staged on-site. This material included concrete, brick, mixed debris, wood chips, soil, drums, scrap metal, railroad ballast, and personal protective equipment. This material was further characterized for disposal purposes and was disposed of along with newly generated waste materials. During the summer of 1999, the former Chemical Management Building was cleaned out and formally decontaminated. Chemicals and contaminated metals associated with the former Chemical Management Building were characterized for off-site disposal and shipped off-site.

Since USACE mobilization, over 100 tons of radiologically contaminated machinery and other metal objects have been processed through GTS Duratek's, Oak Ridge, Tennessee facility for disposal. During August and September of 1999, 952 cubic yards of the most radiologically contaminated materials and 27 drums of solidified uranium raffinates were shipped for ultimate disposal at Envirocare of Utah's permitted landfill. Additionally, the chemicals left inside the former Chemical Management Building were inventoried, packaged, and shipped for off-site disposal/destruction or recycling (depending on the specific chemical) in 1999.

Pre-removal activities included the preparation of temporary facilities that are now in place and preparatory activities that were completed prior to full-scale removal activities. The majority of pre-removal activities were completed over the period of mobilization through December 1999.

Existing temporary facilities are being utilized to support removal activities. These facilities include six site trailers, existing decontamination pads, and a perimeter security fence.

An on-site groundwater treatment facility has been designed, permitted, and constructed and is being operated. Water collected from the excavations and decontamination operations is treated in the system prior to release.

2.5.1 Groundwater Sampling Investigation

As part of the ongoing environmental monitoring program, site personnel measure the depth to water, obtain field parameter measurements, and collect groundwater samples from eight upper groundwater zone monitoring wells and six lower groundwater zone monitoring wells semi-annually. Field measurements for pH, temperature, specific conductivity, turbidity, and dissolved oxygen are performed. The groundwater samples collected are currently analyzed for volatile organic compounds and both total and dissolved metals in accordance with U.S. Environmental Protection Agency (EPA) methodology and for isotopic thorium and total uranium by alpha spectroscopy.

As part of the evaluation of groundwater sampling and data collection, a table of existing and historic well information was compiled, collating known information about site wells from a number of sources, including past reports and personnel interviews. (See Appendix A.)

2.6 SOURCE, NATURE, AND EXTENT OF CONTAMINATION

Processes previously performed at the Site resulted in the presence of both radiological and chemical constituents. The following paragraphs present the known and suspected sources of radiological and chemical constituents, and the nature and extent of these constituents identified at the Site. This information was derived by researching background information; studying aerial photographs; performing gamma walkover surveys; and collecting samples of environmental media for radiological, chemical, and/or geotechnical testing.

2.6.1 Focus of Investigation

Information gathered from the historical investigations has identified four sources of chemicals and radioactivity at the site, including:

- Radioactive and chemical constituents in the surface and subsurface soil within the former Patroon Lake and other fill areas.
- Buried drums within the former Patroon Lake and other fill areas.
- Asphalt and building surfaces contaminated with uranium and thorium.
- Pyrophoric uranium buried beneath the loading dock east of Bay 2.

2.6.2 Extent of Chemicals and Radioactive Materials

Site characterization procedures (including surface feature investigations, gamma walkover surveys, and sampling of environmental media such as shallow and deep soil, sediment, surface water, groundwater, and ambient air) were used to define the nature and extent of the chemical and radioactive constituents present at the Site. The following paragraphs summarize the results of these investigations.

(A) Surface Feature Investigations

Surface feature investigations were performed at the Site prior to the commencement of field activities. These investigations included the evaluation of a chronological series of historical aerial photographs, topographic maps, civil surveys, drawings, and reports. These investigations provided valuable information regarding the location of disposal areas. Information obtained during the investigations was also used to assist in the development of initial sampling strategies to determine the nature and extent of chemical and radioactive materials.

Analysis of historical aerial photographs indicates that a sequential pattern of disposal occurred in the former Patroon Lake area. The disposal was most evident at the northern and southern ends of the lake. Disposal in the lake began sometime between 1940 and 1952, and ended sometime between 1969 and 1975.

(B) Gamma Walkover Surveys

Before beginning sampling activities, a gamma walkover survey was performed at the Site using a field instrument for detecting low-energy radiation (FIDLER). The objective of this survey was to highlight those areas where activity levels were likely to exceed the site-specific cleanup guideline of 35 pCi/g for U-238. A FIDLER reading of 11,500 counts per minute (cpm) was determined to be approximately equivalent to the 35 pCi/g guideline; however, 10,000 cpm was used as a conservative estimate to identify potential areas exceeding the guideline (DOE, 1992b).

The results of the gamma walkover survey showed that virtually all of the surface soil [0 to 15 cm (0 to 6 in.)] at the CISS and at the Town of Colonie vicinity exceeded 10,000 cpm. The information obtained from the survey was used to position the surface soil sampling points.

(C) Soil Sampling

After completing the gamma walkover survey, surface and subsurface soil samples were collected to determine the distribution of radioactivity in the soil. As part of this effort, surface soil samples were collected from beneath the asphalt cover from those areas showing the highest levels of gamma activity. Subsurface soil sampling was later performed across the Site to define the vertical and horizontal extent of radioactivity. Samples from these deeper borings were analyzed for radiological and/or chemical constituents.

For unrestricted release based on radioactive waste only, DOE used 40 CFR 192 cleanup goals for radium (Ra-226 and Ra-228) and thorium (Th-230 and Th-232) of 5 pCi/g when averaged over the top 15 cm (6 in.) of soil, and 15 pCi/g when averaged over any 15-cm (6-in.) interval of soil below the surface layer (DOE, 1993a). For depleted uranium (U-238), the site-specific cleanup guideline for unrestricted use of 35 pCi/g when averaged over any 15-cm (6-in.) interval was adopted (Delaney, 1984).

Specific information on types, frequency, and chronology of sampling, as well as sample results, can be found in the 1995 EE/CA. This information is summarized in Subsection 2.6.3.

2.6.3 Summary of Subsurface Sampling Activities

The results of subsurface soil sampling showed the deepest radiological material at a depth of 6.4 m (21 ft) in borehole B39G12 and the highest activity level (21,000 pCi/g for Th-232) in borehole B39R59 at a depth of 1.4 m (4.5 ft). Both boreholes were drilled within the perimeter of former Patroon Lake. Radiological material outside the perimeter of former Patroon Lake was found as deep as 2.3 m (7.5 ft), similar to the depth of the radiological material beneath the Colonie Building. Radiological material within the perimeter of the former lake included both U-238 and Th-232; U-238 was the primary radionuclide across the remainder of the Site.

The primary non-radiological chemicals that exceeded soil cleanup goals in the 1995 EE/CA included copper and lead. These chemicals were found as deep as 8.5 m (28 ft) beneath the southwest corner of the Colonie Building, and as deep as 6 m (20 ft) in the former Patroon Lake area. Though 14 VOCs were detected in soil, the only compounds that were found in concentrations exceeding NYSDEC standards were most likely laboratory contaminants. Although significant concentrations of VOCs were not identified in soil samples, it is possible that some soil impacted with these compounds could be encountered within the boundaries of a soil-gas plume just west of the Colonie Building. The base neutral acid extractable (BNAE) compounds benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, chrysene, dibenzo(a,h)anthracene, and phenol were detected in soil in concentrations exceeding NYSDEC standards; however, with the exception of bis(2-ethylhexyl)phthalate, these compounds were only detected in 16 or less of the 109 samples analyzed. Bis(2-ethylhexyl)phthalate was found in 55 of the 109 samples, but only exceeded the criterion in one sample and was found in 34 of the accompanying blanks. Consequently, the BNAEs are not significant contaminants at the Site. It should be noted that soil in direct contact with the floating product in monitoring well B39W19S is expected to be impacted with BNAE compounds.

The results of the routine 1992 surface water sampling performed as part of the environmental monitoring program showed total uranium and Th-232 concentrations to be below DOE and proposed EPA maximum level guidelines. Similarly, routine 1992 sediment sampling showed average total uranium and Th-232 to be below 35 and 5 pCi/g, respectively. Additional surface water and sediment sampling performed further downgradient from the site in 1992 showed one sediment sampling location (Location 7) exceeding the 35 pCi/g guideline for uranium. One surface water sample collected from the storm sewer inlet near the eastern edge of former Patroon Lake during a 1993 sampling effort showed no regulatory guidelines exceeded for

volatile organic compounds. Perchlorethene (PCE) was detected in a concentration of 280 µg/L in one surface water sample collected from an open grate just east of the Colonie Building.

Lead was determined to be the primary metal contaminant in groundwater. The average concentration of lead exceeded the New York standard at the time of the investigation (25 µg/L) in five wells. The highest average concentration of lead was 76 µg/L. One background well showed barium, chromium, arsenic, beryllium, lead, and nickel concentrations exceeding the corresponding New York State standards; however, the elevated metals detected were not believed to be representative due to the turbidity of the groundwater. The New York standard referenced for lead applies to public water systems, not groundwater; however, it was used as a benchmark for comparison at the time of the evaluation.

The results from the Direct Push sampling assisted in defining the boundaries of a volatile organic plume on-site and determined that only minimal off-site migration of groundwater has occurred. PCE, trichlorethene (TCE), and/or 1,2-dichloroethene (DCE) were detected in 7 of the 22 sampling locations.

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3. STREAMLINED RISK EVALUATION

This streamlined risk evaluation examines potential exposures from radiological and nonradiological chemicals of potential concern (COPCs) at the Site. The purpose of a streamlined risk evaluation is to determine whether a removal action is justified and to identify what current or potential exposures should be prevented (EPA, 1993). This streamlined risk evaluation uses site-specific data to identify the COPCs and provides an assessment of human exposures from those COPCs. Using the primary radiological and chemical sources listed in the site characterization, the risk evaluation identifies release mechanisms, potential exposure pathways, and receptors for radioactive and chemical constituents. Estimates of radiological dose and nonradiological risk are made for current and future exposure scenarios. Thus, the streamlined risk evaluation focuses on the specific problem for which a removal action may be required.

The final element of this section is to determine risk-based and site-specific soil cleanup criteria for radiological and nonradiological constituents present in contaminated soils at the Site. The risk basis inherent in the derived cleanup criteria must be protective of human health and the environment. Based on a number of historical studies at the Site, the cleanup effort in soils is limited to two radiological constituents (e.g., Th-232 and U-238) and three metals (arsenic, copper, and lead); the decision process is described below. In this Technical Memorandum, cleanup goals for these constituents were determined using models appropriate for radiological and nonradiological chemicals, as also discussed below.

Because the radiological and nonradiological models differ considerably in structure and input requirements, the cleanup levels that were determined for radiological and nonradiological constituents are not based on identical exposure assumptions; however, efforts were made to maintain as much consistency as practical within the limits of a model's adaptability.

3.1 IDENTIFICATION OF CHEMICALS OF POTENTIAL CONCERN

Based on historic site characterization data, the Site COPCs were categorized into radiological and chemical constituents for soil and groundwater (DOE, 1992b). The radiological constituents in soil consist of U-238 and Th-232 and their decay progeny (not in equilibrium). The chemical constituents in groundwater include several volatile organic compounds (VOCs) and metals. The VOCs include tetrachloroethene (PCE), trichloroethene (TCE), 1,2-dichloroethene (1,2-DCE), and vinyl chloride. Note that groundwater will be addressed under a separate CERCLA action. The primary metal contaminants in soil include copper and lead. Other metal contaminants at levels of concern also include arsenic. The screening process used to determine the metal COPCs is described in Subsection 3.1.2.

Previous investigations and studies identified the likely presence of buried drums and miscellaneous debris within the former Patroon Lake and other fill areas. It is unlikely that these items will be intact or have recoverable product due to the length of burial and the fluctuating groundwater table. Based on historical information, there is a potential to encounter pyrophoric uranium waste buried under the former Bay 2 east loading dock.

3.1.1 Radiological

The 1995 EE/CA was reviewed to ensure that appropriate radiological constituents of concern have been adequately considered in planning the removal action. It was determined that the EE/CA adequately considered such constituents. In Subsection 2.6 of this Technical Memorandum, the source, nature, and extent of radiological contaminants are discussed in detail.

The 1995 EE/CA identifies Ra-226 as a radiological contaminant, and Table B-3 of that document shows Ra-226 concentrations up to 45 pCi/g; however, in all cases where elevated Ra-226 concentrations are reported, Th-232 is reported in much higher concentrations (e.g., 100s to 1,000s of pCi/g). Historical activities at the Site did not include Ra-226 so it is likely present as a decay product of uranium or thorium, which were used extensively at the Site.

Assuming that Ra-226 exists as decay product of uranium or thorium, the following relationships would hold true:

- Starting with pure U-234 and assuming a 50-year build-in period, Ra-226 would only equal about 4.82E-06 of the U-234 concentration. Observed Ra-226 concentrations are larger than would be predicted by this build-in.

- Starting with pure Th-230 and assuming a 50-year decay period, Ra-226 would build-in to about 2% of the Th-230 concentration. Observed Ra-226 concentrations are consistent with this build-in.

Considering that Th-230 is always a co-contaminant with Th-232 and that the ratio of Th-232/Th-230 is typically in the range from 10/1 to 1/1 for ores used to extract thorium, it appears that Th-230 is the source of Ra-226 at the Site. The removal actions considered in this document are designed to address Th-232 and, by association, any co-contamination due to Th-230 and its Ra-226 decay product. Considering that Ra-226 would not exist apart from thorium contamination at the Site (see above discussion) and that, where it exists, it will be far less than the Th-232 concentration, Ra-226 is not treated as a separate contaminant of concern.

3.1.2 Non-Radiological

The results of the COPC screening processes used in the 1992 risk assessment and 1995 EE/CA reports were reviewed for proper methodology and accuracy. In the 1992 risk assessment, COPCs were selected on the basis of the following general criteria:

- Frequency of detection.
- Local background level comparisons.
- Nutrients.
- Relative toxicity (i.e., concentration toxicity screen).

Based on risk assessment guidance used in 1992 (EPA, 1989), this was the conventional approach and was performed correctly.

In the 1995 EE/CA, non-radiological chemicals of potential concern were selected by comparing maximum reported chemical levels to EPA Region III risk-based concentrations for industrial reuse of the Site. The approach used in the 1995 EE/CA report was valid assuming the Site's future use was commercial/industrial. Radiological COPCs were identified based on a residential use.

For the purposes of this Technical Memorandum, re-screening of COPCs was performed using more current guidance and assuming future unrestricted use. This re-screening included consideration of the maximum and average levels of site contaminants (based on the 1992 risk assessment report) and risk-based screening concentrations (RBSCs) developed from the most current EPA Region III risk-based concentration (RBC) table (EPA, 2000). Tables 3-1 and 3-2 summarize the results of screening the COPCs.

The decision matrix followed to perform this screening is discussed below.

3.1.2.1 Screening Decision Matrix

The procedure used to screen nonradiological inorganic COPCs for the Site consisted of five decision steps, as depicted in the matrix presented in Figure 3-1:

1. Comparison of the maximum detected concentrations to the residential soil RBSCs at a target hazard quotient (THQ) of 0.1; see Table 3-1. COPCs with ratios exceeding 1.0 were retained for further consideration.

2. Comparison of the 95% upper confidence limit (UCL) of the mean concentration to the residential soil RBSC (THQ = 0.1); see Table 3-2. COPCs with ratios exceeding 1.0 were retained for further consideration.

3. Determination of whether the COPC acts as an essential nutrient in humans;. COPCs that do act as human nutrients were removed from consideration.

4. Review and evaluation of recent site data (IT, 2000) to examine which COPCs could be eliminated due to detection limit issues in the previously developed database. The recent site data are based on more-advanced analytical techniques that are capable of achieving lower detection limits as compared to earlier site characterization samples. Due to high detection limits of the older data, the extent of contamination of certain metals could not be reliably estimated. Review of the recent site data for selenium and thallium indicated that these metals are not widely distributed above the lower detection limit (approximately 1 mg/kg). Furthermore, site data indicate that these metals are located in limited areas associated with copper and lead.

Table 3-1

Detected Soil Concentrations Versus Residential Risk-Based Screening Criteria (RBSC)[a]

Chemical	Range of Detected[b] Concentrations (mg/kg)	Residential Soil RBSC (mg/kg)		Ratio of Maximum to Residential RBSC
ORGANICS[c]				
ACETONE	0.0069 - 3.10	782	N	0.00396
BENZENE	0.0023 - 0.0023	12	C	0.000192
BENZOIC ACID	0.1800 - 0.56	31,286	N	0.0000179
BIS(2-ETHYLHEXYL) PHTHALATE	0.0640 - 1.90	45.6	C	0.0416
BENZYL BUTYL PHTHALATE	0.0770 - 0.077	1,564	N	0.0000492
CARBON DISULFIDE	0.0011 - 0.30	782	N	0.000384
CHLOROBENZENE	0.0017 - 0.0021	156	N	0.0000134
CHLOROFORM	0.0011 - 0.0015	105	C	0.0000143
CYANIDE	0.0017 0.0022	156	N	0.0000141
DI-N-BUTYL PHTHALATE	0.0380 - 0.85	782	N	0.00109
1,2-DICHLOROETHENE, TOTAL	0.0045 - 0.0081	70.4	N	0.000115
DI-N-OCTYL PHTHALATE	2.0000 - 2.00	156	N	0.0128
ETHYLBENZENE	0.0085 - 0.0085	782	N	0.0000109
METHYLENE CHLORIDE	0.0067 - 0.91	85.2	C	0.0107
2-BUTANONE	0.0068 - 0.41	4,693	N	0.0000874
4-METHYLPHENOL	0.2700 - 0.27	39.1	N	0.0069
N-NITROSODIPHENYLAMINE	0.7600 - 0.76	130	C	0.00583
PHENOL	0.0530 - 0.11	4,693	N	0.0000234
ACENAPHTHENE	0.1000 - 0.16	469	N	0.000341
ACENAPHTHYLENE	0.1000 0.10	---		---
ANTHRACENE	0.0048 - 3.00	2,346	N	0.00128
BENZ[A]ANTHRACENE	0.0420 - 3.00	0.875	C	**3.43**
BENZO[B]FLUORANTHENE	0.0470 - 4.00	0.875	C	**4.57**
BENZO[K]FLUORANTHENE	0.0490 - 4.00	8.75	C	0.457
BENZO[A]PYRENE	0.0450 - 4.00	0.0875	C	**45.7**
CHRYSENE	0.0390 - 5.00	87.5	C	0.0571
DIBENZ[A,H]ANTHRACENE	0.0400 - 0.08	0.0875	C	0.903
DIBENZOFURAN	0.0600 - 0.75	31	N	0.024
FLUORANTHENE	0.0450 - 5.00	313	N	0.016
FLUORENE	0.0420 - 0.60	313	N	0.00192
INDENO[1,2,3-CD]PYRENE	0.0500 - 2.00	0.875	C	**2.29**
2-METHYLNAPHTHALENE	0.0360 - 3.00	156	N	0.0192
NAPHTHALENE	0.0460 - 1.80	156	N	0.0115
PHENANTHRENE	0.0430 2.00	---		---
PYRENE	0.0450 - 2.60	235	N	0.0111
SULFIDE	0.0004 0.00038	---		---
TETRACHLOROETHENE	0.0011 - 0.66	12.3	C	0.0537
TOLUENE	0.0013 - 0.25	1,564.0	N	0.00016
1,1,1-TRICHLOROETHANE	0.0018 - 0.00	2,200.0	N	0.0000014
TRICHLOROETHANE	0.0015 - 0.14	58.1	C	0.000241
XYLENES, TOTAL	0.0520 - 0.05	15,643.0	N	0.00000332

Table 3-1 (Continued)

Detected Soil Concentrations Versus Residential Risk-Based Screening Criteria (RBSC)[a]

Chemical	Range of Detected[b] Concentrations (mg/kg)	Residential Soil RBSC (mg/kg)		Ratio of Maximum to Residential RBSC
ALUMINUM (Al)	566 - 10,600	7,821	N	1.36
ANTIMONY (Sb)	11.4 - 205	3.13	N	65.5
ARSENIC (As)	18.9 - 60.6	0.426	C	142
BARIUM (Ba)	9.20 - 427	548	N	0.78
BERYLLIUM (Be)	1.00 - 1.10	15.6	N	0.0703
BORON (B)	17.4 - 485	704	N	0.689
CADMIUM (Cd)	0.97 - 33.8	7.82	N	4.32
CALCIUM (Ca)[d]	404 - 37,900	NUT		NUT
CHROMIUM VI (Cr+6)	1.10 - 40.0	23.5	N	1.70
COBALT (Co)	8.3 - 12.5	469	N	0.0266
COPPER (Cu)	4.70 - 92,300	313	N	295
IRON (Fe)[e]	1,840 - 42,600	2,346	N	18.2
LEAD (Pb)	5.4 - 40,600	400		40.0
NITRATE (NO_3)	0.65 - 0.91	12,514	N	0.00007
MANGANESE (NONFOOD) (Mn)	38.8 - 1,540	156	N	9.84
MERCURY (Hg)	0.10 - 3.50	2.35	N	1.49
MOLYBDENUM (Mo)	18.8 - 34.80	39.1	N	0.89
NICKEL (Ni)	1.80 - 742	156	N	4.74
POTASSIUM (K)[d]	208.00 - 1,450	NUT		NUT
SELENIUM (Se)	16.7 - 450	39.1	N	11.5
SILVER (Ag)	2.00 - 17.5	39.1	N	0.447
SODIUM (Na)[d]	1,080 - 3,980	NUT		NUT
THALLIUM (Tl)	4.0 - 73.6	0.548	N	134
URANIUM (SOLUBLE SALTS) (U)	15.2 - 1,610	23.5	N	68.6
VANADIUM (V)	2.70 - 35.00	54.8	N	0.639
ZINC (Zn)	5.80 - 50,800	2,346	N	21.6

Shading indicates COPC selection based on ratios exceeding 1.0.

NA = Not applicable.

NUT = Nutrient.

[a] Risk-based screening concentrations (RBSCs) were developed from the EPA Region III RBC Table (EPA, 2000) based on a target cancer risk of 1E-06 and a target hazard quotient of 0.1.

The RBSC for lead was based on the CERCLA/RCRA corrective action level of 400 mg/kg based on residential exposure (EPA, 1994b).

[b] Concentration ranges were obtained from Tables 2.3 and 2.7 (DOE, 1992b).

[c] Organics will be addressed as a groundwater issue under a separate action.

[d] Essential nutrients (EPA, 1989).

[e] See Table 3-3 for comparison of site exposure potential to the recommended daily allowance (RDA).

Table 3-2

Screening of Maximum Frequency Detections Versus RBSCs[a]

Chemical	Range of Detected[a] Concentrations	Residential[b] Soil RBSC (THQ, 0.1)		95% UCL	Primary Target Organ	Source	Residential[b] Soil RBC (THQ, 1)		Ratio of 95% UCL to Residential RBC (THQ, 1)
INORGANICS (mg/kg)									
ALUMINUM	566 - 10,600	7,821	N	5,112	CNS	NCEA	78,214	N	0.065
ANTIMONY	11.4 - 205	3.13	N	14	Blood	IRIS	31	N	0.44
ARSENIC	18.9 - 60.6	0.43	C	14	Integument [c] (skin)	IRIS	0.43	C	33.1
CADMIUM	1.0 - 33.8	7.8	N	1.5	Kidney	IRIS	78	N	0.019
CHROMIUM VI	1.1 - 40.0	23	N	11	Lung	IRIS	235	N	0.046
COPPER	4.7 - 92,300	313	N	16,392	Gastrointestinal	HEAST	3,129	N	5.2
IRON	1,840 - 42,600	2,346	N	12,831	NOEL	NCEA	23,464	N	0.55
LEAD	5.4 - 40,600	NA		NA	CNS	IRIS	NA		NA
MANGANESE	38.8 - 1,540	156	N	281	CNS	IRIS	1,564	N	0.18
MERCURY	0.12 - 3.5	2.3	N	0.30	Immune system	IRIS	23	N	0.013
NICKEL	1.8 - 742	156	N	53	Body weight/Organ weight	IRIS	1,564	N	0.034
SELENIUM	16.7 - 450	39	N	97	Integument [c] (skin)	IRIS	391	N	0.25
THALLIUM	4.0 - 73.6	0.55	N	20	Liver/Blood	IRIS	5.5	N	3.7
ZINC	5.8 - 50,800	2,346	N	3,257	Blood	IRIS	23,464	N	0.14

RBC = Risk-based concentration.
RBSC = Risk-based screening concentration.
Shading indicates benchmark exceedance.
NA = Not applicable.
NOEL = The iron RfD is based on no observed effects, and, therefore, there is no critical target organ at this dose.
UCL = 95% Upper confidence limit of the mean concentration detected.

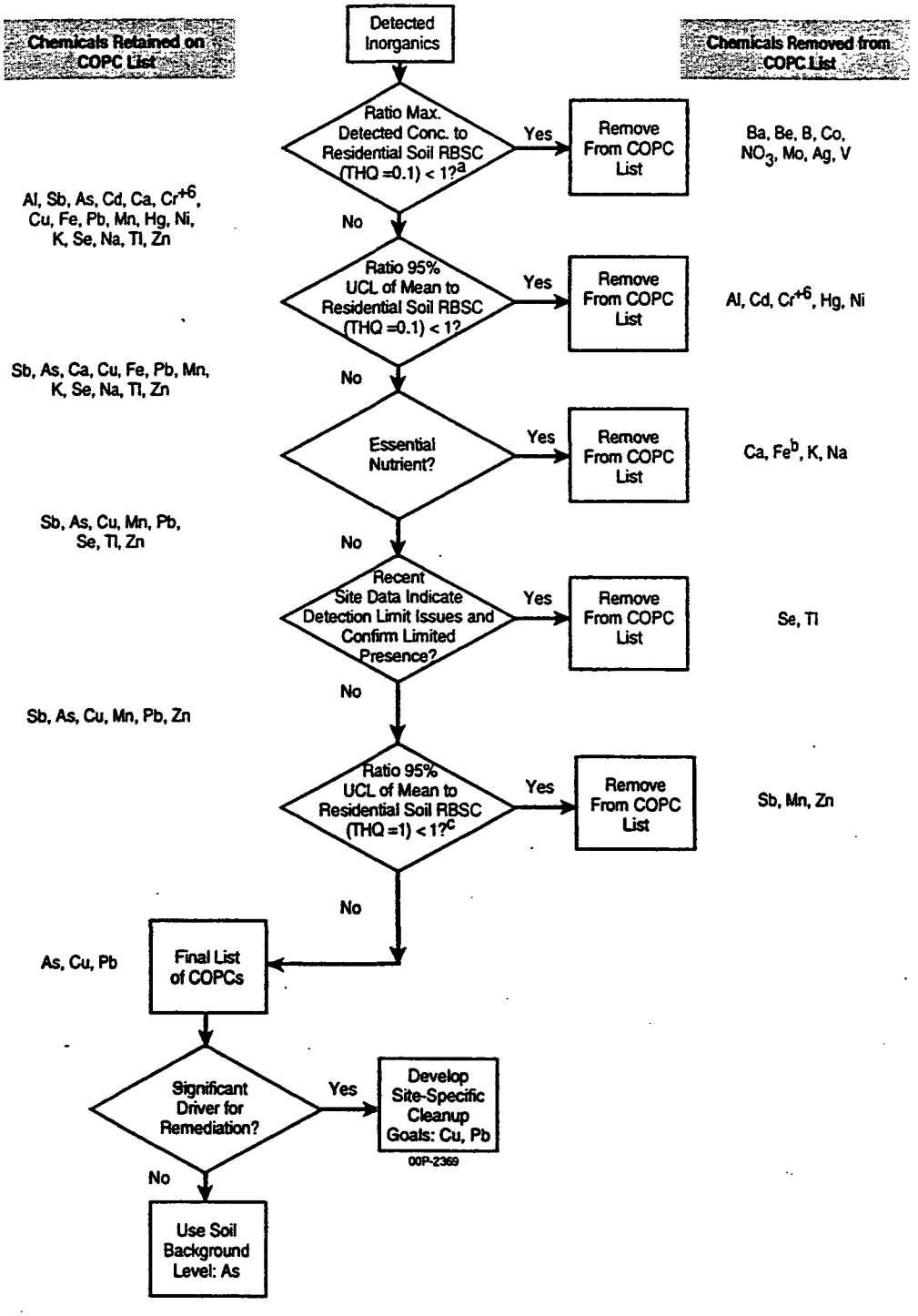
[a] Concentration ranges were obtained from Tables 2.3 and 2.7 (USDOE, 1992).

[b] Risk-based screening concentrations (RBSCs) were developed from the EPA Region III RBC Table (EPA 2000) based on a target cancer risk of 1E-06 and a target hazard quotient of 0.1.

[c] Integument represents the skin, exocrine glands and nails.

Figure 3-1

Screening Decision Process for Chemicals of Potential Concern (Inorganics)



[a] The most conservative RBSCs are based on noncancer effects, except for As (TR=1E-06).

[b] Fe was eliminated by conducting a margin-of-exposure analysis relative to its Recommended Daily Allowance (RDA). See Subsection 3.1.2.1 and Table 3-3.

[c] Selection of a THQ of 1 based on target endpoint analysis. See Subsection 3.1.2.1.

5. Comparison of the 95% UCL of the mean concentration to the residential soil RBSCs (THQ = 1). COPCs with ratios exceeding 1.0 were retained for further consideration.

The result of this five-step decision screening was the identification of three nonradiological COPCs for the Site: arsenic (As), copper (Cu), and lead (Pb).

The health effects of the non-radiological COPCs as well as the radiological COPCs are summarized in Appendix B.

Table 3-1 shows the screening results based on the first step of the process for organic and inorganic compounds. Four carcinogenic PAHs showed the ratio of the maximum detected concentration to the RBSC in excess of 1. Three of the four chemicals showed relatively low ratios (i.e., 2.3 to 4.5). Benzo[a]pyrene showed a ratio of 45.7. All the PAHs were eliminated from future consideration because the frequency of detection was low (i.e., approximately 2 to 4 out of 45 samples). A number of inorganic compounds showed ratios in excess of 1. These compounds were submitted to further screening as shown in Table 3-2. Comparison of the 95% UCLs of these inorganic compounds to their RBSCs at a target hazard quotient (THQ) of 0.1 showed relatively low ratios with the exceptions of arsenic, (33.1), copper (52.4), iron (5.47), lead (40), and thallium (37.1). Note that the lead exceedance is based on comparison with the CERCLA/RCRA Corrective Action Facility residential soil cleanup value of 400 mg/kg.

A general target endpoint analysis was performed based on the critical toxic effect of each of these inorganic compounds. As seen in Table 3-2, none of these compounds had similar critical effects and, therefore, would not be anticipated as additive in terms of critical noncancer toxicity. Based on this evaluation, the RBSCs were adjusted to a THQ of 1 (arsenic remained as a carcinogen) and recompared to their 95% UCL values. With the exceptions of arsenic, copper, and thallium, all inorganic compounds had ratios less than 1.

Based on detection limit issues, thallium was eliminated (see Figure 3-1). Iron was eliminated on the basis of calculation of the margin of exposure as compared with background levels and with its recommended daily dose. As can be seen from Table 3-3, the daily dose of soil-based ingestion of iron by a 15-kg child, whether from background soil or site soil exposure, would be less than the recommended daily allowance. The range of the daily doses for all types of exposure was small, and the margin of exposure of site to background was small. Based on this analysis, three COPCs were selected for cleanup—arsenic, copper, and lead.

It should also be noted that these comparisons are based on residential exposure. The RBSCs based on industrial exposure potential would be considerably higher. Comparison of industrial-based RBSCs with maximum detected and exposure point concentrations would not be expected to result in any risk or noncancer toxicity potential.

Table 3-3

Comparison of Iron Ingestion[a] by Child Resident for Site and Background Iron Levels in Soil
Colonie Site

Exposure Parameter		Local[a] Background Maximum	Site[b] Maximum	Site[b] EPC
EPC	mg/kg	26000	40600	12831
Soil Ingestion Rate	mg/d	200	200	200
Exposure Frequency	d/y	350	350	350
Exposure Duration	y	6	6	6
Conversion Factor	kg/mg	1.E-06	1.E-06	1.E-06
Body Weight	kg/mg	15	15	15
Averaging Time	d	2100	2100	2100
NC Dose[c]	mg/kg-d	0.35	0.54	0.17
Daily dose[d]	mg/d	5.2	8.1	2.6
RDA for child[e]	mg/d	10	10	10
Oral RfD[f]	mg/kg-d	0.3	0.3	0.3

[a] Background level obtained from 1992 Risk Assessment for Colonie Site; Table 2.2.

[b] Site EPC obtained from Table 3-2.

[c] Noncancer (NC) dose calculation based on EPA Region 3 RBC Table (EPA, 2000).

[d] NC dose mulitplied times 15 kg BW.

[e] Recommended Daily Allowance (RDA) from NAS (1989) cited in EPA (1996c)

[f] Provisional oral reference dose (RfD) (EPA, 1996c)

3.1.2.2 Determination of Drivers for Remediation

Once the nonradiological COPCs were determined, the process was refined by the addition of one more step, which was to examine the Site locations of the COPCs with respect to one another. The nature and extent of contamination data developed from the site characterization investigations indicated that U-238, Th-232, copper, and lead were the primary contaminants in soils. Using earthVision software, the footprints of these contaminants plotted at 2-foot depth intervals (up to a maximum of 10 feet) were compared to evaluate co-location and to identify the contaminant with the largest footprint (i.e., driver of the removal action). This analysis is presented in Appendix C and shows that copper and lead are the drivers of the removal action at the selected cleanup levels (refer to the remainder of Section 3). Note that the footprints for COPCs were initially determined using screening levels (i.e., RBSCs). This initial analysis was similar to the refined analysis shown in Appendix C and supported the selection of copper and lead as the removal action drivers.

Next, the earthVision software was used to generate footprints of arsenic at 2-foot intervals to evaluate its co-location with respect to the copper footprint (see Appendix C). Contamination footprints were developed using the historical database. For contaminants with large numbers of non-detects at elevated detection limits (i.e., arsenic), the contouring program was constrained at concentration levels higher than the cleanup goals so that the footprints generated showed where elevated concentrations of contaminants were located with a high degree of confidence. Recent data developed by the removal action contractor (IT, 2000) was also reviewed to help identify and confirm detection limit issues for certain contaminants.

The footprint comparison indicated that the Site soil containing arsenic at the highest concentrations was primarily contained within the footprints of the soil containing copper and lead above the calculated risk-based cleanup level (refer to the remainder of Section 3 for this calculation). Based on these analyses, it was determined that copper and lead are the nonradiological COPC drivers for the removal action at the Site, and that arsenic will be monitored as a COPC, but is not the driver of the action.

3.1.2.3 Determination of Cleanup Levels for Nonradiological COCs

Due to their designation as COPC removal action drivers, site-specific, risk-based cleanup goals were developed for copper and lead (as presented in the remainder of this section). For the other nonradiological COPC (i.e., arsenic), which is co-located with copper and lead, published literature was used, rather than deriving site-specific criteria. For arsenic, a cleanup level of 7.4 mg/kg will be used. This value is the arithmetic average background arsenic concentration for the eastern United States (Shacklette and Boerngen, 1984). Several soil samples were collected during the characterization investigations at the Site to estimate background metals concentrations. These data showed arsenic background concentrations at the Site to be consistent with the published values for the eastern United States.

3.2 GENERIC METHODOLOGY FOR DETERMINING DOSES TO THE CRITICAL GROUP

The central theme for compliance with these regulations (10 CFR 20, Subpart E) is calculation of the dose to the average member of the critical group. The NRC's draft guidance document NUREG-1549, Decision Methods for Dose Assessment To Comply with Radiological Criteria for License Termination (NRC, 1998), provides guidance on how to perform this activity. This approach is consistent with exposure assessment guidelines provided in EPA's Risk Assessment Guidelines for Superfund (RAGS; EPA, 1989c). Briefly, this approach can be described as:

- Identify the critical exposure group.
- Determine the pathways that apply to the exposure group.
- Identify conceptual and mathematical models for calculating pathways doses.
- Select parameters for the models used to calculate the pathway doses.
- Calculate the doses.

The remainder of this section follows the NRC guidance for presentation of the streamlined risk evaluation conducted for the Site. The derived doses/cleanup criteria, as presented in Subsection 3.7, are used to estimate the volume of soil requiring removal, which is presented in Subsection 3.8.

3.3 IDENTIFY THE CRITICAL EXPOSURE GROUP

The initial step involves defining scenarios that most closely describe the likely land use patterns at the Site following completion of removal activities. Site release conditions for restricted and unrestricted uses involve potentially different considerations with respect to human activities (the critical group) on or near the Site. Land use scenarios are defined as reasonable human activities and future uses of the Site. Identification of the site-specific critical group for the exposure scenarios at the Site were based on historical, current, and projected future land uses and the physical characteristics of the Site. The definition of scenarios and identification of pathways can be generic or site specific. In the absence of information adequate to define a site-specific critical group, a generic screening scenario may be used.

A Resident Farmer was used as the generic screening scenario. For this scenario, the farmer is defined as a person who lives on the Site following completion of site remediation, produces some portion of his/her diet on the Site, and drinks water from an on-site well.

Based on the local land uses, as depicted in Figure 2-3, the following scenarios were evaluated for the Site:

- Resident Farmer.
- Urban Resident.
- Industrial Worker.
- Off-Site Drinking Water Receptor.

3.4 DETERMINE THE PATHWAYS THAT APPLY TO THE CRITICAL EXPOSURE GROUP

This streamlined risk evaluation only applies to exposures that occur by way of contaminated soil or groundwater that might become contaminated after leaching from the soil. It does not include pathways associated with contaminated structures. The following pathways are considered for all land use scenarios evaluated for the Site, and applicable pathways are selected for inclusion in the dose assessment. The generic Resident Farmer scenario includes all of these pathways.

- External exposure to penetrating radiation from volume soil sources while outdoors and while indoors.
- Inhalation exposure to resuspended soil while outdoors and while indoors.
- Direct ingestion of soil and incidental ingestion of soil tracked indoors.
- Ingestion of drinking water from a groundwater source (which may be potentially contaminated by soil).
- Ingestion of plant products grown in contaminated soil and ingestion of plant products irrigated with contaminated groundwater.
- Ingestion of animal products grown on-site (i.e., after animals ingest contaminated drinking water, plant products, and soil).
- Ingestion of fish from a contaminated surface water source.

The Resident Farmer scenario has the most pathways and includes external radiation, inhalation, soil ingestion, and contaminated produce pathways. It includes drinking water from a contaminated on-site well; ingestion of produce, meat, and milk that is contaminated; and meat and milk animals drinking water that is derived from a contaminated on-site well. The assumption is made that 100% of drinking water, livestock water, and irrigation water comes from a contaminated on-site well.

The Urban Resident scenario has many, but not all, of these pathways. Pathways include external radiation, inhalation, soil ingestion, and contaminated produce pathways. The produce that is consumed is grown on contaminated soil, but does not include drinking water or irrigation water pathways from a contaminated on-site well. The assumption is made that up to 100% of drinking water and irrigation water comes from a municipal supply.

The Industrial Worker scenario pathways include external radiation, inhalation, and soil ingestion. It assumes that 100% of drinking water comes from an uncontaminated municipal water supply; there is no produce, meat, or milk derived from the Site. The worker is assumed to spend 60 hours per week and 50 weeks a year on-site. One half of this time is spent outdoors.

The Off-Site Groundwater pathway evaluates potential to contaminate off-site groundwater based upon contamination from existing on-site soil. Pathways of direct exposure from ground

surfaces, inhalation, and soil ingestion would only result through direct atmospheric transport off-site. Substantial dilution would occur in this case, and negligible dosing would result.

In all cases, it is assumed that 100% of aquatic food is uncontaminated since the Site urban setting is not expected to provide a fish or shellfish pathway due to the distance from a significant waterway (Hudson River).

Appendix D, Tables 5 and 6, provides a summary of doses by pathway from the uranium and thorium COCs.

3.5 IDENTIFY CONCEPTUAL AND MATHEMATICAL MODELS FOR CALCULATING PATHWAYS DOSES

3.5.1 Radiological Models

Conceptual and mathematical models for radiological constituents have been defined by the NRC in NUREG/CR-5512 (NRC, 1999b). These models are implemented in the DandD computer code and are acceptable for performing dose assessments. (The DandD code is a dose estimating software package prepared by Sandia National Laboratories under contract to the NRC. It is used to implement the methodologies presented in NUREG/CR-5512.) The NRC also allows use of the RESRAD computer code (NRC, 1999a) in performing dose assessments. The RESRAD computer code was developed by Argonne National Laboratory (ANL) for the DOE (ANL, 1993a; ANL, 1993b).

Site conditions at the Site preclude the use of the DandD screening approach. Consequently, DandD and RESRAD were considered for use in performing a limited site-specific analysis involving the use of some site-specific parameter values with predefined models and scenarios.

Unlike DandD, RESRAD does not have prescribed land-use scenarios. Instead, land-use scenarios are developed by including or excluding various exposure pathways.

RESRAD was selected to perform the streamlined risk assessment for the Site because it is designed for conducting site-specific analyses. The SRP Preliminary Guidelines recommend using the parameters listed in Table 2 of that document with RESRAD to ensure consistency with the critical group used in DandD analyses.

The RESRAD code was used to calculate radiological concentrations and ultimately doses to an average member of the critical group from thorium and uranium and their radioactive progeny. In addition, the RESRAD code was utilized to predict estimates of lead concentration and concentration factors in the IEUBK model. This model is presented in Appendix E. RESRAD codes were not necessary to run the Adult Lead Model, nor were they necessary to run the algorithms for copper.

3.5.2 Non-Radiological Models

Figure 3-2 summarizes the potential exposure pathways for metals at the Site based on the exposure scenarios used in this streamlined risk assessment. Due to limitations in the models, dermal and some other exposure pathways could not be evaluated. The *Integrated Exposure Uptake Biokinetic* (IEUBK) model (EPA, 1994a) was used to evaluate lead exposure in children, and the *Adult Lead Model* (EPA, 1996) was used to evaluate lead exposure in nonresidential populations of adults. These models cannot directly calculate exposure doses of lead in the target populations, but default inputs can be adjusted for various site-specific exposure parameters. Both models are premised on achieving the threshold blood lead level in children protective of behavioral neurotoxicity. RESRAD codes were used to develop medium concentrations for the IEUBK model, but they were not needed for the *Adult Lead Model.*

For determining the inputs to the two lead models, the basic fate and transport elements of the RESRAD model were used. RESRAD's basic fate and transport assumptions are applicable to a wide variety of applications. RESRAD was used to evaluate the fate and transport of lead because it allowed for estimating concentrations in soil, water, air, foodstuffs, and fodder, which are needed as inputs into the blood lead models used to estimate the risks from exposure.

Only those portions of RESRAD that were applicable to the task were used. RESRAD was not used for estimating risk/hazard from the exposure to non-radiological chemicals (e.g., lead) in the various media. The media concentrations generated by RESRAD were used as inputs in the IEUBK model for childhood-lead exposure and the EPA Adult Lead Model.

Algorithms following EPA methodology were used to determine soil cleanup levels for copper (EPA, 1989c; EPA, 1996b; EPA, 1998).

3.5.3 Use of Thorium To Model Lead in RESRAD

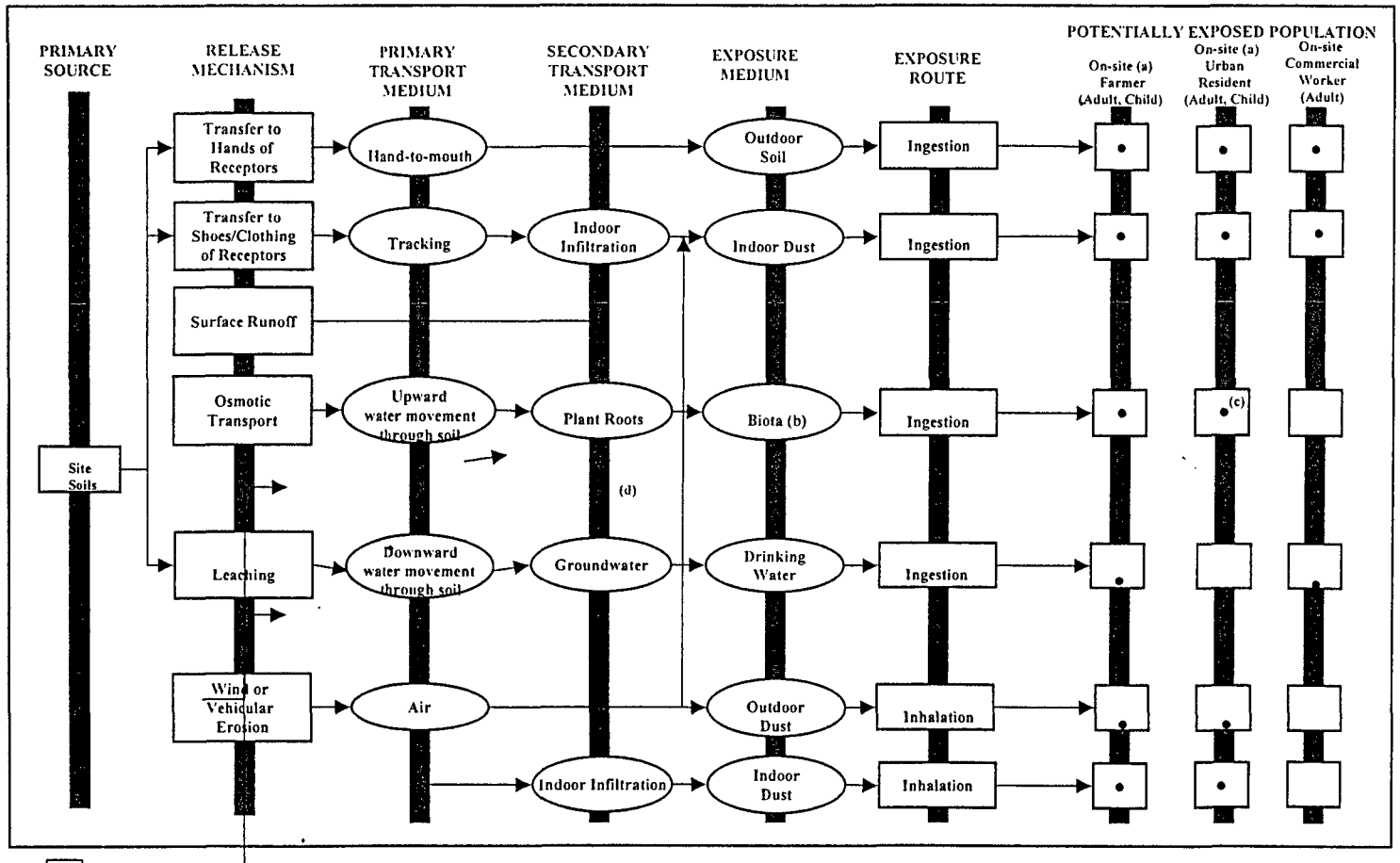
The RESRAD code may be utilized as a transport model to predict the movement and provide an estimate of the concentration of contaminants in groundwater and soil. As the contaminants in the ground migrate, they, like radioactive species, become incorporated into the groundwater. The output at the RESRAD code provides information necessary as input parameters for the IEUBK lead model for children. The RESRAD model may therefore be used to estimate the concentration of the lead contaminant potentially affecting individuals on-site from contaminated soil and groundwater used to irrigate plants, used for drinking water, and incorporated into animal foodstuffs. Other pathways such as inhalation are small compared to the plant pathways. The on-site aquatic pathways are not considered as available and are not included in RESRAD simulations.

The methodology used to "simulate" the lead contaminant in the hydrosphere and soil was to make a long lived radionuclide that:

- Does not appreciably decay during transport off-site over a 1,000-year period.
- Utilizes the RESRAD model food transfer factors.

Figure 3-2

Conceptual Site Model for Metal Exposure
Colonie Site



(a) Lead was evaluated for the child using the IEUBK Model.

(b) Beef cattle, homegrown produce

(c) Only homegrown produce was evaluated; crops are not irrigated with on-site groundwater.

(d) Irrigation of crops with groundwater

Figure 3-2
Conceptual Site Model For Metal Exposure
Colonie Site

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- Utilizes the RESRAD dose conversion factors.
- Has a distribution coefficient identical to lead.
- Utilizes the same NRC and RESRAD default transport and usage fractions associated with ingestion and inhalation pathways as the previous on-site scenarios.

Thorium 232 (14.1 billion year half life) was chosen as the radioactive isotope to simulate an essentially stable non-radioactive material. The thorium distribution coefficient was replaced with the distribution coefficient for lead. In addition, other lead parameters associated with usage and transport factors as well as several site-specific soil hydraulic parameters used in the contaminated and saturated zones in the model were revised for this simulation. Refer to Appendix E for parameters.

The output of the modified off-site RESRAD lead simulation provides a ratio of the lead present in environmental media to the lead initially present at the time of unrestricted release of the site. This provides an estimate of the concentration of lead potentially present in foodstuffs grown in the environment. This concentration was then used along with the IEUBK model.

Appendix E provides a list of the input parameters used in the RESRAD run that are different than the NRC or RESRAD default values. RESRAD summary results for the lead evaluation showing the input parameters for each scenario as well as the corresponding concentration in environmental media are provided in this appendix. Finally, a summary table providing the ratio of lead concentrations present in environmental media to the lead concentrations initially present in soil at the time of unrestricted release of the Site by scenario is provided in Appendix E. Note that because these RESRAD runs were performed to derive the ratios described above, the units shown in Appendix E are not meaningful to this analysis.

3.6 SELECT PARAMETERS FOR THE MODELS USED TO CALCULATE THE PATHWAY DOSES

3.6.1 Radiological Models

Models for each pathway include numerous parameters that must be input to calculate dose. These parameters can be broadly grouped into physical parameters, behavioral parameters, and metabolic parameters. The NRC developed a set of default parameters to be used with DandD for the generic Residential Farmer scenario.

The default physical parameters encompass the variability expected across all regions of the country. The appropriateness of the default physical parameters depends on local geological and meteorological characteristics. Modifications to these parameters were based on the development of a narrower distribution that better represents site-specific features or location, or selection of a more-realistic, but still bounding deterministic value from within the distribution developed for the default analysis. Some physical parameters are surrogates for multiple processes within the model and are not correlated to specific physical processes that will be significantly different from site to site.

3.6.2 Non-Radiological Models: Lead

EPA has not assigned verified or provisional toxicity values (i.e., cancer slope factors [CSFs] and reference doses [RfDs]) to lead because the toxicity data available to date are inadequate for evaluation by their current methodology; therefore, lead risk and cleanup levels cannot be calculated using conventional risk assessment methods. EPA has developed the IEUBK model (EPA, 1994a) and the Adult Lead Model (EPA, 1996) that characterize lead risk directly to children and indirectly to the fetus via adults based on environmental exposure to lead-contaminated media (EPA, 1994a; EPA, 1996).

The primary concern with environmental lead exposure is the potential for causing behavioral neurotoxicity in young children (NIH and CDC standard of 6 years of age or under) as a result of chronic, low-level lead exposure through various contact mechanisms. It is believed that this potential for toxicity is best related to the blood lead level in young children. Scientific investigators and regulatory agencies, such as EPA (EPA, 1996), believe the threshold for behavioral neurotoxicity in children is a blood lead level of 10 μg/dL. Women of childbearing age who come in contact with environmental lead contamination may inadvertently expose the developing fetus to lead, resulting in neurotoxicity to the developing fetus and infant.

Both the Integrated Exposure Uptake Biokinetic (IEUBK) and Adult Lead models are predicated on the assumption of a 95% probability that the blood lead level in the fetus should not exceed 10 μg/dL in order to be protective against neurotoxicity.

3.6.2.1 IEUBK Model

Levels of lead in the blood reflect exposure to environmental lead through a number of contact mechanisms, including soil ingestion, dust inhalation, drinking water ingestion, dietary exposure, and lead received from maternal blood during gestation. Lead absorption, distribution, storage and excretion, and the dynamic interactions of these processes (i.e., pharmacokinetic processes) in humans are complex, and are subject to both physiologic and environmental variables (EPA, 1996). Based on results of empirical studies of real time human exposures correlated with measurements of blood lead levels and behavioral toxicity information in children, EPA has developed the IEUBK lead model for children (EPA, 1994a).

The IEUBK model predicts child blood lead levels from media concentration data and childhood exposure parameters supplied by the user in combination with pharmacokinetic constants modeled from scientific studies and empirical human data. Although these parameters were developed through scientific consensus, many of the assumptions used in the model are still the subject of scientific debate, and, therefore, the blood lead levels calculated from the IEUBK model are hypothetical; however, note that the model was validated against empirical data (EPA, 1994a). In general, the model is designed to predict blood lead levels of a population of children, in the age range of 6 months to 6 years old. IEUBK has default inputs, which can be modified to a certain extent by site-specific information. The default values are considered representative of typical background exposures to lead reported on a national basis.

Calculating soil cleanup levels cannot be done directly with the IEUBK model. Typically, site-specific exposure point concentrations for various media, such as soil, drinking water and air, are input to the model along with the site-specific and/or default exposure assumptions. The outputs of the model are expressed graphically and in tables in terms of the blood lead level in children; however, the model can be adjusted for the indirect calculation of a soil cleanup level as follows:

- Set the soil concentration input parameter to a theoretical cleanup level.
- Maintain the desired site-specific exposure parameters.
- Determine if 95% or more of the hypothetical child population has a blood lead level of 10 µg/dL or less.
- If the blood lead level is greater than 10 µg/dL, then a lower soil cleanup value is input. This process is repeated repetitively until a soil level is attained that meets the desired blood level (i.e., 10 µg/dL) or less.

The IEUBK model requires inputs of medium concentrations (e.g., air, soil, fruiting and nonfruiting vegetables, meat, and fish). These concentrations were extrapolated from medium-to-soil ratios developed through the RESRAD model. The following specific procedure was used:

- Ratios of lead in various media (µg/kg) to lead in soil (µg/g), as developed through the RESRAD model, were multiplied with the soil lead concentration (in ppm or mg/kg) being tested as the soil cleanup level.
- The resulting value was converted to the appropriate concentration units for input into the IEUBK model along with the selected exposure parameters and soil concentration to calculate the acceptable blood lead level (i.e., at least 95% of the child population had to have blood leads below 10 µg/dL).

3.6.2.2 Adult Lead Model

The Adult Lead model (EPA, 1996) is also premised on the protection of fetuses and newborns from lead-indirect neurotoxicity. It differs from the IEUBK in that the protection is based on indirect exposure of the fetus through soil contact by an industrial/commercial worker of childbearing age. A major limitation of the adult lead model relative to the Site is that only direct soil/dust exposure can be accurately evaluated (i.e., dietary or drinking water inputs can not be evaluated with certainty). The advantage of the adult model is that it directly outputs an acceptable soil lead level based on the exposure inputs.

The model algorithm input assumptions and output results are presented in Subsection 3.7. The default input assumptions are values based on empirical data from peer-reviewed studies of the human population (EPA, 1996). Values can be chosen within the default ranges based on site-specific information concerning the nature of the population that may be exposed at the Site. For those exposure inputs having a range of values, a single input was selected for this evaluation based on the following rationale:

- *Geometric Standard Deviation (GSD) – 1.95.* The EPA technical work group (TRW) estimates that 1.8 to 2.1 is a plausible range for GSD, based on an evaluation of available blood lead concentration data for different types of populations nationwide. Higher values in the range would be more reflective of a heterogeneous population. Lower GSD values in the range would reflect less inter-individual variability such as seen in populations within a localized area and who share the same ethnic, cultural, or socioeconomic factors. In cases where site-specific data are not available, a value within this range should be selected based on an assessment as to whether the population at the Site would be expected to be more or less heterogeneous. Since future demographic data of this type were unavailable, it was assumed that the future worker population at CISS would be at the midpoint of the range; therefore, if the blood lead values could be measured in this hypothetical population, it was assumed to have a GSD of 1.95.

- *Adult Baseline Blood Lead Level ($Pb_{adult,0}$) – 1.95 µg/dL.* The baseline blood lead concentration is intended to represent the best estimate of a reasonable central background blood lead value (geometric mean) in women of childbearing age. These women are assumed as not exposed to lead-contaminated nonresidential soil or dust at the site, but experience lead exposure from other sources such as diet, drinking water, and soils/dust contaminated by other (i.e., background) sources. In the absence of high quality data for the site, baseline blood lead concentrations may be extrapolated from estimates for other surrogate populations that would be expected to have a similar blood lead distribution as that of the population of concern. The plausible range proposed by the EPA is 1.7 to 2.2 µg/dL (EPA, 1996). For this evaluation, a geometric mean of 1.95 µg/dL at the middle of the range was chosen to represent women workers (EPA, 1996).

3.6.3 Non-Radiological Models: Copper

The soil cleanup criteria for copper were developed following guidance presented in the *Soil Screening Guidance* (EPA, 1996b) and *Risk Assessment Guidance for Superfund* (RAGS; EPA, 1989c), as modified with site-specific exposure assumptions if possible, and updated toxicity values. Additional methodology for the ingestion of vegetables was obtained from the *Human Health Risk Assessment Protocol for Hazardous Waste Combustors* (EPA, 1998).

Three on-site exposure scenarios and one off-site scenario were evaluated – the Resident Farmer, the Urban Resident, the Industrial Worker, and the Protection of Off-Site Groundwater. These are described in detail in other parts of this Technical Memorandum. Key assumptions and algorithms are provided in Appendix F.

Noncancer cleanup criteria were based on the 1 to 6 year old child, the most sensitive potential receptor. The soil cleanup criteria were calculated for noncancer effects at a THQ of 1.0. Based on differing target organs for the metal COPCs (copper and lead), the THQ of 1.0 is appropriate. Table 3-2 lists primary target organs for each of the metal COPCs.

For indirect exposure pathway cleanup criteria for the Resident Farmer and Urban Resident, only vegetable ingestion was evaluated. The algorithms for the beef ingestion and milk ingestion pathways involved too much uncertainty, and contributed little to the risk; therefore, they were not evaluated.

3.7 CALCULATING THE DOSE

The applicable pathways are selected for analysis by the computer code (e.g., DandD) based on the critical exposure group. The parameters are entered or modified, as needed, and the maximum dose is calculated for a period of 1,000 years after completion of the decommissioning.

3.7.1 Site-Specific Values for Radiological Dose Assessments for the Site

3.7.1.1 Sensitivity Analysis

An initial RESRAD analysis was performed using the default parameters listed in Table 2 of the SRP Preliminary Guidelines. The U.S. Nuclear Regulatory Commission Document entitled *Preliminary Guidelines for Evaluating Dose Assessments in Support of Decommissioning* was used to establish an NRC-approved set of default parameters for running RESRAD. This guidance uses the Resident Farmer as the default scenario. In addition, the parameters, assumptions, and RESRAD default values used as initial estimates to perform a sensitivity analysis are listed in Appendix D.

In those cases where the NRC guidance did not specify a value for a parameter, the RESRAD defaults were used. The guidance specifies that all exposure pathways be switched on with the exception of the radon pathway. The parameters, assumptions, and RESRAD default values used as initial estimates to perform the sensitivity analysis are listed in Appendix D.

The cleanup criterion calculated using the NRC default assumptions is 11.35 pCi/g for U-238 as shown in Table 3-4. The size of the contaminated area, length of the contaminated area parallel to the aquifer, depth of contamination, and distribution coefficient (K_d) values were varied to evaluate the sensitivity of the cleanup criterion to variations in these parameters. These results are also shown in Table 3-4.

Based on the foregoing analysis and within the range of these variables appropriate for the site, the cleanup criterion is insensitive to the size of the contaminated area and the length of the contaminated area parallel to the aquifer flow; however, the cleanup criterion is strongly (almost linearly) dependent on the thickness of the contaminated zone and the distribution coefficient (K_d).

Table 3-4

Sensitivity Analysis for Uranium-238 Cleanup Criteria

Parameter Description	Parameter Range	U-238 pCi/g
Contaminated Area	1200 m^2	11.36
	NRC Base Case (2400 m^2)	11.35
	4800 m^2	11.34
Length Parallel to Aquifer Flow	50 m	11.35
	NRC Base Case (100 m)	11.35
	200 m	11.35
Thickness of Contaminated Zone	0.45 m	22.64
	NRC Base Case (0.9)	11.35
	1.8 m	5.98
Distribution Coefficient	7.5	5.68
	NRC Base Case (15)	11.35
	30	23.26

3.7.1.2 Site-Specific Hydraulic Factors

The sensitivity analysis performed as described in Section 3.7.1.1 evaluated contaminated area, length parallel to aquifer flow, thickness of contaminated zone, and distribution coefficient. Within the range of interest, the results were insensitive to contaminated area and length parallel to aquifer flow. However, cleanup goals were almost linearly dependent on thickness of contaminated zone and distribution coefficient. Consequently, values for these parameters were estimated based on best available information rather than using NRC base case values.

For the most part, insufficient information was available to derive site-specific values for other RESRAD parameters. Sufficient data was available to estimate several site-specific soil hydraulic parameters. These parameters are better suited to the Site than the computer code default values, are based on local geological conditions, and are more representative of the hydraulic circumstances as it exists on-site. Sensitivity analysis was not performed for these parameters; however, use of site-specific values resulted in less restrictive cleanup goals.

Three soil hydraulic parameters required as input by RESRAD were reviewed against site-specific data, which, in turn, were used to develop input values more suitable to the Site. The soil hydraulic parameters for porosity, slope of water retention curve, and the saturated hydraulic conductivity were revised for use in the contaminated and saturated zones of RESRAD for simulations. Details associated with these site-specific soil hydraulic parameters and references used to derive them are found in Appendix G.

3.7.1.3 Other Site-Specific Factors

Additional investigations undertaken in 1999 present diagrams showing contamination thickness of surface deposits that are up to 9 feet thick. Additionally, there are a number of buried lenses of contamination varying from 1 to 4 feet thick. An average thickness of 2 meters was selected to cover the majority of the contamination thickness found at the site (BNI, 1993).

The distribution coefficients, K_d, for the various contaminants of concern are affected by soil type and pH. This information was utilized along with a review of literature to help determine a site-specific distribution coefficient. Table 4-9 of the characterization report for the Site (DOE, 1992b) reports pH data from on-site wells ranging from 6.7 to 11 and averaging from 7.1 to 8.7 depending upon well depth. Cross-sectional diagrams show significant amounts of sand at the site (BNI, 1993), and the unconfined aquifer consists largely of sand; therefore, data for sandy soil were reviewed.

Uranium K_d values tabulated in Table J.4 (EPA, 1999a) for a range of pHs in quartz show a value of approximately 250 at a pH of 7.7, dropping to a value of approximately 62 at a pH of 8.3. The RESRAD data collection handbook (ANL, 1993) provides a geometric mean K_d of 35 cm^3/g with a range of 0.03 to 2,200. Based upon the EPA data showing a minimum K_d of 62 in quartz with a pH of 5.2 to 8.3 and the site characterization (DOE, 1992b) showing a minimum of 124.4 cm^3/g, a prudent value of one-half the lowest site-specific value was chosen. This yields a uranium K_d of 62 cm^3/g.

Lookup table I.5 (EPA, 1999a) presents thorium data in a pH range of 5 to 8, yielding a K_d range from 1,700 to 300,000 cm^3/g. Since the thorium will not reach groundwater and therefore not affect the thorium cleanup goal for water-dependent pathways regardless of the K_d value chosen, a large K_d was selected to reflect non-water dependent pathways and result in health-protective cleanup goals; however, the lower K_d value was chosen when determining soil goals necessary to be protective of off-site groundwater in order to result in the most conservative goals, albeit breakthrough time exceeding 1,000 years.

Lookup table F.2 (EPA, 1999a) provides lead K_ds at pH ranges of 4.0 to 6.3 as 150 to 8,650 cm^3/g. The RESRAD data collection book (ANL, 1993) provides a geometric mean in sand as 270 cm^3/g. This value was selected since it will result in a health protective cleanup goals value.

The distribution coefficient for copper, 22 cm^3/g, was obtained from the literature (Dragun 1995).

The EPA document (EPA, 1999a) does not address K_ds of the progeny radionuclides from uranium and thorium (actinium, protactinium, and radium). A review of K_d values from (ANL, 1993a) and (NRC, 1992) indicates that the NRC values are more conservative. The NRC default values have been utilized in the RESRAD code.

For modeling purposes, the USACE assumed that the Site will be backfilled to grade, with a minimum of two feet of soil, with most areas requiring a greater backfill depth.

3.7.2 Residential Farmer Exposure Group - Radiological

The RESRAD code was used to provide doses and develop cleanup goals for the Residential Farmer exposure group. Parameter inputs were based upon a combination of NRC default parameters specified by the NRC (NRC, 1999a), site-specific data, and RESRAD default parameters. The input parameters utilized are listed in Appendix D. A brief description of the source of selected input parameters is described below. These values were utilized for all site-specific RESRAD runs for the Residential Farmer, Urban Resident, and Industrial Worker exposure groups.

Appendix D provides a summary description of the transport pathways and usage fractions considered in the RESRAD code. These pathways and usage fractions allow the user to vary input parameters and hence the model output for any of the RESRAD exposure group scenarios chosen. The Resident Farmer site-specific uranium parameter and thorium parameter inputs are listed in Appendix D.

The Resident Farmer scenario includes all the transport pathways listed. It assumes that 100% of drinking water comes from a contaminated on-site well; 100% of ingested produce, meat, and milk is contaminated; and 100% of meat and milk animal drinking water comes from a contaminated on-site well. It assumes that 100% of drinking water, livestock water, and irrigation water comes from a contaminated on-site well. It assumes that 100% of aquatic food is uncontaminated, since the Site urban setting is not expected to provide a fish or shellfish pathway due to the nearness of a significant waterway (Hudson River).

A summary of these pathways and the associated dose fractions for U-238 and Th-232 is included in Appendix D. In the case of uranium, the vast majority of the activity is from depleted uranium comprised primarily of U-238, and dose contributions from U-234 and U-235 are very small. The cleanup criterion for U-238 is almost completely controlled by the contaminated groundwater pathway, which accounts for approximately 98% of the dose. In the case of thorium, the vast majority of the activity is expected to be Th-232. The cleanup criterion for Th-232 is completely controlled by the external radiation and water-independent plant pathways, which together account for 100% of the dose.

The corresponding uranium and thorium cleanup goals are tabulated in Table 3-5. Appendix D provides the parameter input data and output file showing pathway doses and cleanup goals values for the Resident Farmer scenario. This scenario takes into account the anticipated 2-foot minimum of soil placed over the excavated area for grading and leveling purposes.

3.7.3 Urban Resident Exposure Group - Radiological

In a similar manner to the Residential Farmer exposure group, the transport pathways and the usage fractions are considered for the Urban Resident exposure group; however, a limited set of exposure pathways are evaluated in this scenario.

The Urban Resident scenario includes external radiation, inhalation, and the contaminated produce pathways. It assumes that the resident grows 25% of the produce they consume in a garden on contaminated property, but that the garden is not irrigated with contaminated groundwater. It assumes that 100% of drinking water comes from an uncontaminated municipal supply; 100% of ingested meat and milk is uncontaminated; 100% of aquatic food is uncontaminated; and that no animals are raised on-site.

As with the Residential Farmer scenario, the majority of the activity in depleted uranium is U-238; the contributions from the U-234 and U-235 isotopes are small. The cleanup criterion for U-238 is completely controlled by the external radiation and water-independent plant pathways, which together account for 100% of the dose. For thorium, the majority of the activity is expected to be Th-232. In this case, the cleanup goals are completely controlled by the external radiation and water-independent plant pathways, which together account for 100% of the dose.

The corresponding uranium and thorium cleanup goals are tabulated in Table 3-6. Appendix D provides the parameter input data and output file showing pathway doses and cleanup goals for the Urban Resident scenario. This scenario takes into account the anticipated average 2-foot of soil placed over the excavated area for grading and leveling purposes.

Soil exposure for this scenario is limited to the first nine feet of the soil column, the maximum anticipated excavation depth attributable to residential construction. Under this future land-use scenario, soil up to nine feet could be excavated and brought to the surface as part of a residential construction project; therefore, this scenario effectively treats all soil on the Site as surface soil.

Table 3-5

Resident Farmer Cleanup Criteria Summary—Radiological COCs

Isotope	Cleanup Criteria, pCi/g	Isotope	Cleanup Criteria, pCi/g
U-238	37.1	Th-230	3.5
U-235	26.5	Th-232	1.5
U-234	34.7	-	-

Table 3-6

Urban Resident Cleanup Criteria Summary—Radiological COCs

Isotope	Cleanup Criteria, pCi/g	Isotope	Cleanup Criteria, pCi/g
U-238	1,373	Th-230	9.0
U-235	225	Th-232	2.8
U-234	2,629	-	-

3.7.4 Industrial Worker Exposure Group - Radiological

The transport pathways and the usage fractions considered for the Industrial Worker exposure group are shown in Appendix D. A lesser number of pathways exist for this scenario than for others, primarily because foodstuffs are not grown in an industrial setting.

The Industrial Worker scenario includes external radiation and inhalation. It assumes that 100% of drinking water comes from an uncontaminated municipal supply; 100% of ingested meat and milk is uncontaminated; 100% of aquatic food is uncontaminated; and that no animals are raised on-site. It assumes that a worker spends 60 hours per week and 50 weeks per year on the site for a total of 3,000 hours or 0.3425 years. The model assumes that one-half of this time is spent outdoors.

The summary of the pathways and the associated dose fractions for U-238 and Th-232 is shown in Appendix D. Based on the fact that the majority of the activity in depleted uranium is U-238, the contributions from the U-234 and U-235 isotopes are small. The cleanup criterion for U-238 is completely controlled by the external radiation pathway, which accounts for 100% of the dose. For thorium, the majority of the activity is expected to be Th-232. In this case, the cleanup criterion is completely controlled by the external radiation pathways, which accounts for 100% of the dose.

The corresponding uranium and thorium cleanup goals are tabulated in Table 3-7. Appendix D provides the parameter input data and output file showing pathway doses and cleanup goals for the Industrial Occupant scenario. This scenario takes into account the anticipated average 2-foot of soil placed over the excavated area for grading and leveling purposes.

3.7.5 Off-Site Groundwater Scenario - Radiological

The Residential Farmer scenario considers all RESRAD dose pathways; consequently, no other on-site or off-site land use scenario will cause a higher dose to a member of the public and result in lower cleanup goals; however, the Site may be released under the Urban Resident or Industrial Worker scenarios, which do not include all of the RESRAD pathways. RESRAD evaluations for these limited site use scenarios assume that the on-site receptor receives the maximum dose and is the critical receptor.

The potential exists for contamination to migrate off-site, which may result in dose pathways to a nearby resident that are not considered in the limited site use scenarios described earlier; therefore, an evaluation of pathways and associated dose to a nearby resident is performed to determine whether the off-site resident is the critical receptor.

Both of the limited site use scenarios include direct radiation exposure from ground surfaces, inhalation, and soil ingestion. Such contamination must move off-site by atmospheric transport for these pathways to exist at a nearby resident. Substantial dilution would occur during this transport, and the off-site contamination layer would be much less than the two-meter thickness

Table 3-7

Industrial Worker Cleanup Criteria Summary—Radiological COCs

Isotope	Cleanup Criteria, pCi/g	Isotope	Cleanup Criteria, pCi/g
U-238	4,024	Th-230	36
U-235	682	Th-232	7.6
U-234	19,270	-	-

assumed to exist on-site. As a result, the nearby resident would receive substantially lower dose from these pathways than the on-site receptor in the limited use scenarios.

The water-independent meat and milk pathways are not included in either of the limited use scenarios and would only exist at a nearby residence after atmospheric transport and associated dilution. These pathways result in only 0.09% of the dose for the uranium Resident Farmer scenario and result in only 7.2% of the dose for the thorium Resident Farmer scenario. Substantial dilution would occur during this transport, and the off-site contamination layer would be much less than the two-meter thickness assumed to exist on-site. As a result, the dose received by a nearby resident from these pathways would be negligibly small compared to the dose received by the on-site receptor for the limited use scenarios.

The water-independent plant pathway is not included in the Industrial Worker scenario and would only exist at a nearby residence after atmospheric transport and associated dilution. This pathway results in 0.93% of the dose for the uranium Resident Farmer scenario and 49.8% of the dose for the thorium Resident Farmer scenario. Substantial dilution would occur during this transport, and the off-site contamination layer would be much less than the two-foot cover soil thickness assumed to exist on-site. Considering this dilution and the fact that the Industrial Worker scenario cleanup criterion is only 4.2 times that of the Resident Farmer, the dose received by a nearby resident from these pathways would be negligibly small compared to the dose received by the on-site receptor for the Industrial Worker scenario. The following exposure pathways were not included in the limited use scenarios: drinking water, fish, plant, meat, and milk pathways.

The off-site uranium water-dependent pathways represent the only credible scenario for a nearby off-site resident to be the critical receptor. The hydraulic gradient at the site is from the north to south; therefore, a residential property proximate the southern border of the site should be most susceptible to off-site groundwater contamination. Properties along the northern side of Yardboro Avenue would be closest to the southern border of the site. The closest boundary line of these properties appears to be approximately 150 feet or 46 meters from the southern border of the site (DOE, 1995a, Figure 1.29). It is assumed that the off-site receptor well is located approximately 40 meters from the Site boundary.

3.7.5.1 Appendix K Methodology To Evaluate Off-Site Groundwater

To provide thorough consideration of the impact of contaminated soil, potential leaching to groundwater for protection of off-site groundwater receptors was evaluated. In that regard, evaluations were conducted based upon knowledge of what the maximum concentrations in off-site groundwater can be, and worked "backwards" to determine what the maximum on-site soil concentration (source) could be. That maximum on-site soil concentration (source) represents the soil cleanup level protective of groundwater off-site.

The method presented in Appendix K of the RESRAD Manual (ANL, 1993b) was used to evaluate potential off-site doses from groundwater pathways. This approximation method will account for advective transport, lateral dispersion, and the decay and ingrowth of radionuclides in the saturated zone, but does not consider longitudinal dispersion. Further discussion of the

equations used to modify the RESRAD code for off-site doses, and a summary table of the inputs and calculated values using this methodology is included as Appendix H.

As an additional and independent assessment of off-site groundwater pathways for the radiological and non-radiological primary contaminants, the RESRAD output was reviewed against the DOMENICO program to ensure a conservative analysis (see next subsection and Appendix H).

The Appendix K (ANL, 1993b) methodology specifies that RESRAD be run using an unsaturated zone to model saturated flow off-site. Based on the results obtained, the following unsaturated zone assumptions were made in the uranium Resident Farmer scenario. Other parameters were the same as for the saturated zone.

- Hydraulic conductivity - 0.4511 m/y
- Thickness of unsaturated zone simulating saturated zone - 2.89 m
- Depth of pump below water table - 7.11 m

The results of this analysis indicated that thorium and lead contaminants do not reach the off-site well within the 1,000-year time frame used to perform the risk assessment. Consequently, the off-site resident would not receive any dose from groundwater pathways from these chemicals. Uranium does breakthrough within the 1,000 year evaluation period, and an off-site dose occurs at approximately 438 years.

The calculated breakthrough times are:

- Uranium - 438 years
- Thorium - infinite (based on code calculation limits)
- Lead - 3,852 years (Action level in off-site well)
- Copper - 1,000 years (Action level in off-site well)

Additional modeling and evaluation of off-site groundwater concentrations were performed utilizing the DOMENICO code (next subsection). Results of this modeling indicate breakthrough of uranium and resulting concentrations that are higher than those predicted by RESRAD. As a consequence, off-site uranium concentrations in groundwater become the limiting factor in determining the cleanup criterion for the Residential and Industrial Occupant scenarios.

3.7.5.2 DOMENICO Program To Evaluate Off-Site Groundwater

DOMENICO was selected as an appropriate tool to represent groundwater at the Site. DOMENICO is one of many analytical solutions to the advection dispersion equation for predicting contaminant transport. The approach was to use DOMENICO "backwards" starting with the maximum contaminant level in groundwater off-site and to then determine the corresponding maximum contaminant level in groundwater on-site. Finally, conventional partitioning calculations were performed to determine the soil contaminant level that would leach the maximum concentration in groundwater on-site.

The DOMENICO code was utilized as a check on the RESRAD code results since lead has been observed in groundwater even though RESRAD indicates no breakthrough for over 3,800 years. The DOMENICO code was therefore run to further evaluate uranium groundwater concentration results to ensure that RESRAD results were conservative. Appendix H provides details of uranium and lead parameter inputs utilized to run the DOMENICO program as well as off-site uranium and lead concentration results.

The DOMENICO code shows that off-site uranium breakthrough occurs within the 1,000-year dose assessment. The maximum off-site concentration would be approximately 1.43 pCi/L contrasted to the RESRAD generated value of 4.26 pCi/L. The DOMENICO code predicts substantial breakthrough (i.e., greater than 0.1%) of uranium at 200 years and a resulting time-dependent off-site groundwater concentration that results in a U-238 cleanup criterion of 110 pCi/g.

For copper, the maximum concentration in off-site groundwater was set at 1,300 µg/L (the EPA Action Level). The concentration of copper in on-site groundwater (directly below the site) predicted by the model to yield the EPA Action Level in the off-site groundwater was 1,392 µg/L. Using the models, the on-site soil concentration protective of groundwater was calculated to be 9,457 mg/kg.

3.7.6 Non-Radiological (Lead)

As stated earlier, the lead models have limitations when compared to the RESRAD model. These relative limitations preclude complete consistency with the RESRAD model. The exposure inputs used in the lead models reflect RESRAD exposure assumptions as much as possible.

3.7.6.1 Farmer and Urban Resident Exposure Model

The approach used in the IEUBK model was to adjust inputs for dietary intake and drinking water consumption. "Background" dietary exposures used as defaults in the model are based on national food survey data. These defaults can be bypassed by switching to an "alternate diet" menu, which allows the user to input lead concentration data for homegrown fruits and vegetables, fish, and meat. The modified inputs were based on ratios of lead in various media (i.e., nonleafy and leafy vegetables, meat, fish, and crustacea) to soil, and based on output from the RESRAD model. Ratios used are shown in Table 3-8. Ratios from the RESRAD simulations at 1,000 years were used. Although milk ratios were available, they could not be input into the alternate diet menu, and, therefore, were not accounted for in the lead soil cleanup results.

Lead ratios were provided in units of micrograms per kilogram (µg/kg) medium per micrograms per gram (µg/g) soil. To back calculate soil cleanup levels in the IEUBK model, the ratios for each medium were multiplied with the hypothetical soil concentration representative of a risk-based cleanup level. By trial and error, appropriate medium concentrations and their corresponding soil concentrations were input into the IEUBK model to obtain a blood lead concentration protective of the childhood population. The results of the lead model are expressed

Table 3-8

RESRAD Medium: Soil Ratios and IEUBK Medium Intake Assumptions

Medium	***Medium to Soil Ratio***	***Daily Medium Intake (MI)***
	ppb : ppm	*kg/kg-day*
Drinking Water	NA	NA
Nonleafy Vegetables	5.660	NA
Leafy Vegetables	5.920	NA
Vegetable Average	**5.790**	1.41E-03
Meat	0.365	5.10E-04
Milk	0.203	1.86E-02
Fish	0.245	NA
Crustacea	0.082	NA
Fish*	**0.327**	7.59E-04

* Fish + Crustacea

as an aggregate population of children ranging in age from 6-months to 6 years old. The calculations required for these conversions are shown in Tables 3-9 and 3-10.

For the on-site Farmer scenario, dietary intake was a function of lead concentrations calculated in various media. To account for drinking water exposure, it was assumed that the groundwater concentration for the farmer was equivalent to the action level of lead in drinking water (i.e., 15 ppb; EPA, 2000). For the on-site Urban Resident, it was assumed that no groundwater exposure was present (i.e., water from a public water system would be available for irrigating home garden plots); therefore, dietary inputs were the default background values, and the drinking water input was estimated as just less than the federal lead compliance level, 0.005 mg/L (40 CFR 141.86(d)(4)), a national background level of 4 ppb.

The IEUBK model differs from RESRAD with regard to vegetable concentration and consumption data. IEUBK has inputs for both fruits (e.g., tomatoes) and vegetables (e.g., aboveground and below ground). RESRAD has inputs in the form of nonleafy (which would include both below ground [e.g., carrots] and aboveground [e.g., tomatoes] and leafy (e.g., lettuce) vegetables. This dichotomy required assumption adjustments to achieve consistency with RESRAD; therefore, it was assumed that total leafy and nonleafy lead concentrations were representative of all vegetables and fruits. This total intake was input into the dietary fruit menu of IEUBK, and the vegetable input in IEUBK was left blank. The total leafy and nonleafy ratio was determined by averaging the two individual inputs (see Table 3-8).

The IEUBK model allows the user to account for the concentration of indoor dust as it relates to outdoor soil concentrations. To be consistent between the radiological and nonradiological exposure scenarios, the indoor dust levels of lead were assumed to be 40% of the outdoor soil concentration.

3.7.6.2 Industrial Worker Adult Exposure

The adult lead model only evaluated contact with soil through soil and indoor dust ingestion. It did not take into account inhalation, dietary factors, or drinking water ingestion. To achieve as much consistency as possible between the radiological and nonradiological exposure scenarios, the exposure assumptions were adjusted to reflect a total soil/dust ingestion rate of 50 mg/day, an indoor infiltration factor of 40%, and a weighted indoor/outdoor soil ingestion fraction of 50%. Equation 2 of the adult lead model was used for the calculations. Discussion of inputs and results is presented in Section 4.

3.7.7 Non-Radiological (Copper)

Table 3-11 includes a summary of the cleanup criteria for copper in the Resident Farmer, Urban Resident, and Industrial Worker scenarios. Soil ingestion, dermal contact, inhalation, and vegetable ingestion were considered, as follows. For indirect exposure pathway cleanup goals for the Resident Farmer and Urban Resident, aboveground and belowground vegetable ingestion was evaluated. Vegetable ingestion was not evaluated for the Industrial Worker scenario. A detailed description of the calculation of copper cleanup goals is provided in Appendix F.

Table 3-9

Dose Constants for Use in IEUBEK

Parameter	*Units*	*Symbol*	*Value*
Fraction Ingested	(-)	FI	1
Exposure Frequency	(days/year)	EF	350
Exposure Duration	(years)	ED	6
Body Weight	(kg)	BW	15
Averaging Time	(days)	AT	2190

$$\text{Pb Intake (ug/day)} = \frac{MI * 1000 * FI * EF * ED * BW}{AT}$$

Table 3-10

Lead Concentrations in Media and Associated Uptake

Soil Pb (ppm)	Media Concentrations (ug/kg)			
	Veg (ppb)	Meat (ppb)	Fish* (ppb)	Milk (ppb)
10	0.058	0.004	0.003	0.002
15	0.087	0.005	0.005	0.003
20	0.115	0.007	0.007	0.004
25	0.144	0.009	0.008	0.005
30	0.173	0.011	0.010	0.006
35	0.202	0.013	0.011	0.007
37	0.213	0.013	0.012	0.008
38	0.219	0.014	0.012	0.008
39	0.225	0.014	0.013	0.008
40	0.231	0.015	0.013	0.008
45	0.260	0.016	0.015	0.009
50	0.289	0.018	0.016	0.010
55	0.317	0.020	0.018	0.011
60	0.346	0.022	0.020	0.012
65	0.375	0.024	0.021	0.013
70	0.404	0.025	0.023	0.014
75	0.433	0.027	0.024	0.015
80	0.462	0.029	0.026	0.016
85	0.490	0.031	0.028	0.017
90	0.519	0.033	0.029	0.018
95	0.548	0.034	0.031	0.019
100	0.577	0.036	0.033	0.020
105	0.606	0.038	0.034	0.021
110	0.635	0.040	0.036	0.022
115	0.664	0.042	0.038	0.023
120	0.692	0.044	0.039	0.024
125	0.721	0.045	0.041	0.025
130	0.750	0.047	0.042	0.026
140	0.808	0.051	0.046	0.028
150	0.866	0.054	0.049	0.030
160	0.923	0.058	0.052	0.032
170	0.981	0.062	0.056	0.035
180	1.039	0.065	0.059	0.037
190	1.096	0.069	0.062	0.039
200	1.154	0.073	0.065	0.041
300	1.731	0.109	0.098	0.061
400	2.308	0.145	0.131	0.081
500	2.885	0.182	0.163	0.102

Soil Pb (ppm)	Uptake Through Media (ug/day)			
	Veg	Meat	Fish*	Milk
10	1.17	0.03	0.04	0.54
15	1.76	0.04	0.05	0.81
20	2.34	0.05	0.07	1.08
25	2.93	0.07	0.09	1.35
30	3.51	0.08	0.11	1.62
35	4.10	0.09	0.12	1.89
37	4.33	0.10	0.13	2.00
38	4.45	0.10	0.14	2.05
39	4.56	0.10	0.14	2.10
40	4.68	0.11	0.14	2.16
45	5.27	0.12	0.16	2.43
50	5.85	0.13	0.18	2.70
55	6.44	0.15	0.20	2.97
60	7.02	0.16	0.21	3.24
65	7.61	0.17	0.23	3.51
70	8.19	0.19	0.25	3.78
75	8.78	0.20	0.27	4.04
80	9.36	0.21	0.29	4.31
85	9.95	0.23	0.30	4.58
90	10.53	0.24	0.32	4.85
95	11.12	0.25	0.34	5.12
100	11.70	0.27	0.36	5.39
105	12.29	0.28	0.37	5.66
110	12.87	0.29	0.39	5.93
115	13.46	0.31	0.41	6.20
120	14.04	0.32	0.43	6.47
125	14.63	0.33	0.45	6.74
130	15.21	0.35	0.46	7.01
140	16.38	0.37	0.50	7.55
150	17.55	0.40	0.53	8.09
160	18.72	0.43	0.57	8.63
170	19.89	0.45	0.61	9.17
180	21.06	0.48	0.64	9.71
190	22.23	0.51	0.68	10.25
200	23.40	0.53	0.71	10.79
300	35.11	0.80	1.07	16.18
400	46.81	1.07	1.43	21.57
500	58.51	1.33	1.78	26.96

* Fish + Crustacea

Table 3-11

Cleanup Criteria for the Site

		Risk Scenario (assumes two feet of soil cover)			
		Resident Farmer	Urban Resident	Industrial Worker	Protection of Off-Site Groundwater
Contaminant	Units				
U-228[2]	pCi/g	37	1,373 110[1]	4,024 110[1]	110
Th-232[2]	pCi/g	1.5	2.8	7.6	N/A
Pb Total	mg/kg	37	450	1,219	N/A
Cu Total	mg/kg	194	1,912	51,150 9,457[1]	9,457
As Total	mg/kg	7.4	7.4	7.4	N/A

[1]Protection of groundwater for the Off-Site drinking water scenario is the limiting factor for these scenarios.

[2] Cleanup goals represent values in excess of background.

For the Resident Farmer, non-cancer effects of copper exposure through vegetable ingestion drove the cleanup levels. The ingestion rates were based on the 1998 combustor guidance (EPA, 1998). The same aboveground and belowground vegetable ingestion rates were used for the child of both the Resident Farmer and Urban Resident. Regarding the fraction ingested, for the child of the Resident Farmer, it was assumed that all produce grown onsite was ingested throughout the year at the calculated ingestion rate. Therefore, the fraction ingested (FI) was 100%, as recommended in the combustor guidance (EPA, 1998).

For the Urban Resident, vegetable ingestion also drove the non-cancer cleanup level for copper (1,912 ppm). As stated earlier, the same vegetable ingestion rate was used as in the Resident Farmer scenario; however, the fraction ingested was less. For the child of the Urban Resident, an FI of 0.075 (7.5%) was calculated. This was based on extrapolation of home-produced food consumption data from the EFH (EPA, 1997a), as presented in detail in Appendix F.

For the Industrial Worker, the copper cleanup criterion was driven by the soil ingestion pathway. Under this scenario, vegetables would not be grown, nor ingested, on the property; however, incidental soil ingestion and/or inhalation could occur during the course of the standard work week. Refer to Appendix F for details.

3.8 EFFECT OF CLEANUP CRITERIA ON VOLUME AND DESTINATION OF REMOVED SOIL

The soil cleanup criteria for the various risk scenarios are summarized for U-238, Th-232, and non-radiological metals in Table 3-11. These cleanup criteria directly determine the quantity of soil required to be addressed during the response action, and soil quantity is the primary factor that drives the cost of the response action.

Regulatory criteria, in conjunction with the risk-based cleanup criteria, establish the various disposal options available for managing the soils from the Site. A portion of the impacted soils at the site may be classified as source material of higher activity (U-238 greater than 170 pCi/g and Th-232 greater than 54.5 pCi/g), requiring disposal at a facility licensed to receive low level radioactive waste (LLRW). Another portion of impacted soils at the site contains radiological constituents above the release criteria established in the risk assessment, but below the criteria for LLRW, requiring disposal at a permitted RCRA Subtitle C facility, hereinafter referred to as low activity radiological material (LARM). The remaining portion of impacted materials at the Site contains radiological constituents below the risk-based criteria; however, they may contain characteristic metals contamination, which following on-site stabilization for metals is no longer classified as hazardous. As a result, these materials will be disposed at a permitted waste landfill.

A summary of the regulatory and risk-based criteria as they relate to the various disposal options is presented for each risk scenario in Table 3-12. Note that the more-stringent radiological cleanup criteria for U-238, derived for protection of off-site groundwater, were applied to the Urban Resident and Industrial Worker scenarios to provide a greater level of protection to human health and the environment. Similarly, the more-stringent cleanup level for copper, derived for protection of off-site groundwater, was applied to the Industrial Worker scenario.

Using the criteria in Table 3-12, estimates of the quantity of impacted soil at the Site were developed. The volume estimates were generated with earthVision software based upon the site model previously developed by SAIC using data from the Colonie Characterization Report (DOE, 1992b) and boring logs from the remedial investigation (DOE, 1991). A summary of the estimated in-situ volumes of soil exceeding the cleanup goals is provided in Table 3-13. This analysis indicates that approximately 1,000 cy of soil will require disposal as LLRW. Due to the differing radiological and metals cleanup goals, the quantity of soil for disposal at a RCRA Subtitle C facility ranges from approximately 28,178 cy (Industrial Worker scenario) to approximately 211,225 cy (Resident Farmer scenario).

Table 3-12

Cleanup Criteria Relating to Disposal Facility Options

Resident Farmer Scenario:

Parameter	Units	Disposal Facility	
		LLRW	Subtitle C (LARM)
U-238	pCi/g	>170	37-170
Th-232	pCi/g	>54.5	1.5-54.5
Pb Total	mg/kg	n/a	>37
Cu Total	mg/kg	n/a	>194
As Total	mg/kg	n/a	>7.4

Urban Resident Scenario:

Parameter	Units	Disposal Facility	
		LLRW	Subtitle C (LARM)
U-238	pCi/g	>170	110-170
Th-232	pCi/g	>54.5	2.8-54.5
Pb Total	mg/kg	n/a	>450
Cu Total	mg/kg	n/a	>1,912
As Total	mg/kg	n/a	>7.4

Industrial Worker Scenario:

Parameter	Units	Disposal Facility	
		LLRW	Subtitle C (LARM)
U-238	pCi/g	>170	110-170
Th-232	pCi/g	>54.5	7.6-54.5
Pb Total	mg/kg	n/a	>1,219
Cu Total	mg/kg	n/a	>9,457
As Total	mg/kg	n/a	>7.4

Table 3-13

Estimated In-Situ Volumes of Impacted Soil at the Site

Disposal Facility	In-Situ Soil Volume (cy)[1,2]								
	Resident Farmer			Urban Resident			Industrial Worker		
	Designated Area[3]	Eastern Area[3]	Total	Designated Area[3]	Eastern Area[3]	Total	Designated Area[3]	Eastern Area[3]	Total
LLRW	902	60	962	902	60	962	902	60	962
Subtitle C (LARM)	138,710	71,553	210,263	38,239	19,732	57,971	24,500	2,716	27,216
Total	139,612	71,613	211,225	39,141	19,792	58,933	25,402	2,776	28,178

[1]Volumes shown do not include over-excavation factor of 5%.

[2]Volumes of metals-impacted soils limited to no greater than 9 ft bgs.

[3]Term refers to a geographic area of the site as shown on Figure 2.2.

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4. REMOVAL ACTION OBJECTIVE

This section provides descriptions of action objectives for the Site. Soil is the only medium addressed under this action; groundwater will be addressed under a separate CERCLA action. The general removal action objectives for the Site are to mitigate further release of radiological and hazardous material to the surrounding environmental media, and minimize risk to human health and the environment.

More specifically, the removal action objective is to protect human health and the environment by altering the waste source (i.e., uranium, thorium, lead, copper, and arsenic in soil) or otherwise reducing the potential for human or environmental exposure in the following ways:

- Minimize the potential for humans to ingest or come into dermal contact with, or inhale, contaminants of concern present in soil.
- Minimize the potential exposure to external gamma radiation.
- Minimize potential contaminant migration by controlling/minimizing surface water runoff, leaching, and erosion processes through removal, stabilization, and/or environmental isolation of soil contaminants.
- Prevent exposures to radioactivity that would result in a dose in excess of 25 millrem (mrem) per year and exposure to metals that would exceed risk-based standards.
- Achieve proposed cleanup criteria for U-238, Th-232, and metals in soil based on site-specific analyses and projected future uses of the Site.

Actions taken to protect human receptors will also have the effect of reducing the risk to the environment. Radiological and chemical risk to ecological receptors is minimal due to the lack of suitable habitat. Discussion of risk to ecological receptors is addressed in Appendix I.

4.1 IDENTIFICATION OF POTENTIAL ARARS

Three different federal government agencies have authority to establish standards and regulations associated with the cleanup and remediation of radioactively contaminated sites: DOE, NRC, and EPA. In addition, the State of New York has regulations and guidance associated with remediation of radioactively contaminated sites within its jurisdiction.

The standards set by DOE are for the use of DOE, and, therefore, are not available for use by USACE at the Site. The regulations promulgated by the NRC and the EPA both have the potential for being applicable or relevant and appropriate requirements (ARARs) for the Site. New York State regulations may be potential ARARs to the extent they are legally enforceable and are more stringent than the federal regulations.

Table 4-1 lists potential ARARs for contamination in the soil at the Site, identifying each as chemical-specific, location-specific, or action-specific.

4.1.1 Chemical Specific - Radiological

The Site contains elevated levels of uranium and thorium in soil. This material originated from operations governed by an NRC license. When DOE obtained the Site, the existing NRC licenses were no longer maintained. A formal termination process, in accordance with established NRC procedures or regulations for these licenses, was never undertaken. Had the Site not been conveyed to the DOE, however, NRC license termination and decommissioning regulations would have applied to closure activities at the Site. As such, NRC regulations covering license termination, and their associated limits on radiation exposure from residual radioactive materials, are potentially relevant and appropriate for radiological contaminants in soil at the Site. Specifically, these regulations are Title 10 of the United States Code of Federal Regulations, Part 20, Subpart E (10 CFR 20.1401 through 1406).

4.1.1.1 Unrestricted Release

Subpart E of 10 CFR Part 20, "Radiological Criteria for License Termination," provides in Section 20.1402 for unrestricted release of soils that are cleaned up to 25 mrem per year total effective dose equivalent (TEDE) to the average member of the critical group and that have been reduced to levels that are as low as reasonably achievable (ALARA). The critical group is defined as the group of individuals reasonably expected to receive the greatest exposure to residual radioactivity for any applicable set of circumstances.

Cleanup criteria for uranium and thorium associated with a particular scenario at a total pathway dose equivalent to 25 mrem per year were calculated using RESRAD. The cleanup criteria are expressed as concentration of uranium and thorium in units of pCi/g. Potential land use scenarios considered in the development of cleanup goals include:

- On-Site Resident Farmer – The On-Site Resident Farmer scenario includes all pathways and usage fractions as shown in Appendix D, Tables 3 and 4. It assumes that 100% of drinking water comes from a contaminated on-site well; 100% of ingested produce, meat, and milk is contaminated; and 100% of meat and milk animal drinking water comes from a contaminated on-site well. It assumes that 100% of drinking water, livestock water, and irrigation water comes from a contaminated on-site well. It assumes 100% of aquatic food is not contaminated.

- Urban Resident – The Urban Resident scenario includes external radiation, inhalation, and the contaminated produce pathways as shown in Appendix D, Tables 3 and 4. It assumes that the resident grows 25% of the produce they consume in a garden on contaminated property and that the garden is not irrigated with contaminated groundwater. It assumes that 100% of drinking water comes from an uncontaminated municipal supply; 100% of ingested meat and milk is uncontaminated; 100% of aquatic food is uncontaminated; and that no animals are raised on-site.

Table 4-1

Potential ARARs for the Site

Standard, Requirement, Criteria, or Limitation	Citation	Description of Requirement and Potential ARAR Type	Alternative 2B and/or 3B	Applicable or Relevant and Appropriate Requirement	Comment
NRC Regulations	10 CFR 20 Subpart E Section 20.1402 "Radiological Criteria for Unrestricted Use"	Radiological criteria for unrestricted use; residual radioactivity distinguishable from background results in a TEDE to an average member of the critical group that does not exceed 25 mrem per year, and has been reduced to levels that are ALARA. ARAR Type: Chemical-Specific	2B	Relevant and Appropriate	Formerly a NRC licensed site. License never formally terminated, due to transfer of operations to DOE. As such, NRC license termination regulations are the most relevant and appropriate.
NRC Regulations	10 CFR 20 Subpart E Section 20.1403(a), (b), (e) "Criteria for License Termination Under Restricted Conditions"	Radiological dose criteria for restricted use: 1-The licensee has made provisions for legally enforceable institutional controls that provide reasonable assurance that the TEDE from residual radioactivity distinguishable from background to the average member of the critical group does not exceed 25 mrem per year. 2- Residual activity at the site has been reduced so that if the institutional controls were no longer in effect, there would be reasonable assurance that the TEDE from residual radioactivity distinguishable from background to the average member of the critical group is ALARA and ▪ Would not exceed 100 mrem/yr, or	3B	Relevant and Appropriate	A site is considered acceptable for restricted release if: Further reductions in residual radioactivity necessary to comply with 10 CFR 20.1402 would result in net public harm or were not made because residual levels associated with restricted release conditions are ALARA.

Table 4-1

Potential ARARs for the Site (Continued)

Standard, Requirement, Criteria, or Limitation	Citation	Description of Requirement and Potential ARAR Type	Alternative 2B and/or 3B	Applicable or Relevant and Appropriate Requirement	Comment
		▪ Would not exceed 500 mrem/yr, provided that the licensee demonstrates that further reductions in residual radioactivity necessary to comply with the 100 mrem/yr value are not technically achievable, are prohibitively expensive, or would result in net public or environmental harm. ARAR Type: Chemical-Specific			

Table 4-1

Potential ARARs for the Site (Continued)

Standard, Requirement, Criteria, or Limitation	Citation	Description of Requirement and Potential ARAR Type	Alternative 2B and/or 3B	Applicable or Relevant and Appropriate Requirement	Comment
Treatment Standards	40 CFR 268.40, 268.48, and 268.49	Restricts the land disposal of hazardous wastes and requires treatment to reduce a waste's toxicity and/or minimize contaminant migration. Requires that on-site stabilization treatment for lead achieve the UTS of 0.75 mg/L based on TCLP test. ARAR Type: Action-Specific	2B and 3B	Applicable	Applicable to the on-site treatment of soils under Alternatives 2B and 3B.
State Pollutant Discharge Elimination System (SPDES)	6 NYCRR 754.1, 754.2, 754.4, 756.1, 756.2, and 756.3	Requires permit for the discharge of pollutants for any point source and stormwater runoff into waters of the United States. ARAR Type: Action-Specific	2B and 3B	Applicable	Substantive requirements for a permit must be met for discharge to a surface water body if water generated during the remediation is discharged to surface water. Exempt from permitting.

- Industrial Worker – The Industrial Worker scenario includes external radiation and inhalation, as shown in Appendix D, Tables 3 and 4. It assumes that the worker obtains all food and drinking water from uncontaminated off-site sources. It assumes that a worker spends 60 hours per week and 50 weeks per year on the site for a total of 3,000 hours or 0.3422 years. It is assumed that one-half of this time is spent outdoors.

- Off-Site Drinking Water Receptor – Calculation of dose to the off-site drinking water receptor assumes that all groundwater-dependent pathways exist at the off-site location. All groundwater-independent pathways are assumed not to exist because there is no initial soil contamination. This scenario includes all groundwater dependent pathways, except aquatic foods, as shown in Appendix D, Tables 3 and 4. It is assumed that 100% of drinking water comes from a contaminated on-site well; 100% of ingested produce, meat, and milk may be contaminated; and 100% of meat and milk animal drinking water comes from an on-site well. It assumes that 100% of drinking water, livestock water, and irrigation water comes from an on-site well. It assumes 100% of aquatic food is not contaminated.

The On-Site Resident Farmer scenario considers all RESRAD dose pathways as potentially complete. Consequently, no other on-site or off-site land use scenario will result in a higher dose to a member of the public or result in a lower cleanup criteria. However, the Site may be released under the restricted site use conditions that are described for the Urban Resident or Industrial Worker scenarios. These two limited use scenarios do not include use of contaminated groundwater. Consequently, an off-site resident having no restrictions on groundwater usage may incur a higher dose than the on-site receptor. In fact, the streamlined risk evaluation described in Section 3 demonstrated that protection of off-site groundwater is the controlling factor in selecting a U-238 cleanup criterion for the Urban Resident and Industrial Worker scenarios.

RESRAD runs for the above-listed scenarios yielded a range of cleanup criteria. These results were summarized in Table 3-10.

4.1.1.2 Restricted Release

Subpart E of 10 CFR Part 20 provides in Section 20.1403 for license termination under restricted conditions. Restricted release involves institutional controls and financial assurance mechanisms. Radiological dose controls for restricted use include:

- Demonstrate that further reductions in residual radioactivity to comply with 10 CFR 20.1402 would result in net public or environmental harm or were not being made because the residual levels associated with restricted conditions are ALARA.

- Provisions for legally enforceable institutional controls must be made to provide reasonable assurance that the TEDE from residual radioactivity distinguishable from background to the average member of the critical group will not exceed 25 mrem per year.

- Residual radioactivity at the site has been released so that if the institutional controls were no longer in effect, there is a reasonable assurance that the TEDE from residual radioactivity distinguishable from background to the average member of the critical group is ALARA and would not exceed either 100 mrem per year, or 500 mrem per year provided it can be demonstrated that compliance with the 100 mrem per year value is not technically achievable, is prohibitively expensive, or would result in net public or environmental harm.

4.1.2 Chemical Specific – Non-Radiological

No chemical-specific potential ARARs were identified for metals.

4.1.3 Location Specific

No location-specific potential ARARs were identified.

4.1.4 Action Specific

Action-specific ARARs are usually restrictions on the conduct of certain activities or the operation of certain activities or the operation of certain technologies at a particular site. These requirements are triggered by the particular remedial activities that are selected to accomplish an alternative. Action-specific requirements do not in themselves determine the remedial alternative; rather, they indicate how the alternative must be achieved. Action-specific potential ARARs for the Site include the land disposal restriction (LDR) treatment standards and universal treatment standards (UTS) for the on-site treatment (i.e., stabilization) of soils that are characteristic wastes, and the State Pollution Discharge Elimination System (SPDES). Action-specific potential ARARs are included in Table 4-1, and discussed in the following subsections.

4.1.4.1 Treatment Standards

Treatment standards (LDR and UTS) involving the land disposal of hazardous waste are contained in 40 CFR 268.40, 268.48, and 268.49. These regulations require the on-site treatment (i.e., stabilization) of characteristic waste under both alternatives to attain certain standards to reduce a waste's toxicity and/or minimize contaminant migration. It is anticipated that the levels of lead in soils will be problematic at the site. Under these regulations, the treatment standard for lead is 0.75 mg/L based on the TCLP test.

4.1.4.2 SPDES

Excavations operations under both alternatives would require dewatering of groundwater to access impacted soils. Water collected in the dewatering system would need to be treated and discharged off-site under a SPDES permit. Effluent limitations would be developed from technology-based treatment requirements and a site-specific evaluation. Activities at the Site

must comply with the SPDES substantive requirements (6 NYCRR Parts 754.1, 754.2, 754.4, 756.1, 756.2, and 756.3), but are exempted from permitting requirements under Section 121(e) of CERCLA.

4.2 CLEANUP CRITERIA

4.2.1 Radiological

Soil that contains radiological COCs may be removed during remediation to differing levels of concentration to meet the differing dose and risk criteria outlined by CERCLA regulations and potential ARARs. The ultimate cleanup level used in the removal of soils containing radiological COCs is based upon the potential land use scenario chosen. The land use scenarios are described in Subsection 4.1.1.

4.2.2 ALARA Analysis Based on DG 4006 Methods

Compliance with NRC license termination requirements requires a demonstration that the dose criteria of 10 CFR 20, Subpart E have been met and a demonstration whether it is feasible to further reduce the levels of residual radioactivity to levels below those necessary to meet the dose criteria (i.e., to levels that are "as low as reasonably achievable"). Section 3 of NRC Draft Regulatory Guide DG-4006 describes acceptable methods for determining when it is feasible to further reduce concentrations of residual radioactivity to below the concentrations necessary to meet the dose criteria.

The simplified method estimates when a further reduction action is cost effective. If the desired beneficial effects ("benefits") from the further reduction action are greater than the undesirable effects ("costs") of the action, the further reduction action being evaluated is cost effective and should be performed. Conversely, if the benefits are less than the costs, the level of residual radioactivity is already ALARA without taking the further reduction action.

In order to compare the benefits and costs of a remediation action, it is necessary to use a comparable unit of measure. The unit of measure used here is the dollar; all benefits and costs are given a monetary value.

DG-4006, regulatory position 3.1.5, specifies that, in certain circumstances, the results of an ALARA analysis are known on a generic basis and an analysis is not necessary. For residual radioactivity in soil at sites that will have unrestricted release, generic analyses show that shipping soil to a low-level waste disposal facility is unlikely to be cost effective, largely because of the high costs of waste disposal; therefore, shipping additional soil to a low-level waste disposal facility generally does not have to be evaluated for unrestricted release. An ALARA analysis was not performed on the Resident Farmer scenario because it is an unrestricted release.

ALARA analyses were performed on the Urban Resident and Industrial Worker scenarios as shown in Appendix J. The results indicate that the cleanup criteria derived for these scenarios are

already ALARA. As with the unrestricted release scenario, this is largely because of the high cost of waste disposal.

DG-4006, regulatory position 3.1.6, states that other factors should be included in the ALARA analysis if the site will be released under restricted conditions or if it has residual radioactivity from site operations in groundwater. Two other factors are explicitly described: (1) costs incurred to implement and maintain site restrictions, and (2) collective dose from consumption of groundwater.

Consideration of costs to implement restricted conditions is not considered applicable to the ALARA analyses because these costs are included in the removal action cost estimates and comparative analysis of Sections 5 and 6. The off-site risk assessment assumed that the potable aquifer has a small volume and cannot supply a large population. In addition, the retardation factor for groundwater transport to a well only 40 meters downgradient from the site boundary is such that thorium does not reach the nearest off-site well in 1,000 years, lead just reaches this well in 1,000 years, and uranium reaches it in approximately 500 years. Very few properties exist within 40 meters of the site, and concentrations of uranium in wells further downstream will be much less. Uranium-contaminated groundwater will not reach downstream wells much further downstream than 80 meters from the site boundary. Given the small volume of the aquifer and the small number of possible affected members of the off-site public, groundwater dose calculations for the site critical group are considered to adequately represent the collective dose from groundwater, and consideration of collective dose for the entire downstream population is not necessary.

4.2.3 Non-Radiological

Soil that contains the non-radiological COPCs (in this case, lead, copper and arsenic) may be removed during remediation to differing levels of concentration to meet the differing dose and risk criteria outlined by CERCLA regulations. The ultimate cleanup level used in the removal of soils containing non-radiological COPCs is based upon the potential land use scenario chosen.

In determining the lead and copper cleanup criteria, the same NRC-approved potential land use scenarios were evaluated as those used for the radiological cleanup criteria, namely:

- On-Site Resident Farmer, which considers risks associated with metals contamination in soil and groundwater media. In soil media, plant uptake and ingestion is considered. In groundwater media, both groundwater ingestion and plant irrigation uptake is considered.

- Urban Resident, which considers risks associated with metals contamination in soil and groundwater media. In soil media, residential gardening and ingestion is considered. No groundwater ingestion or irrigation media are considered.

- Industrial Worker, which considers only risks associated with metals contamination in soil. No groundwater ingestion or gardening are considered for this scenario.

- Off-Site Drinking Water Receptor, which considers only groundwater risks based on metals contamination that would migrate off-site. In the case of lead, it was determined that the partitioning coefficient indicates a great affinity of lead for the soil, and that breakthrough of lead contamination would be extremely minimal within 1,000 years (see Appendix H). The DOMENICO model was used to determine behavior of metals contamination based on partitioning between soil and groundwater.

A parameter included in both the radiological dose and metals risk evaluations is the presence of an average of 2 feet of clean soil fill for excavated areas of the Site. Inclusion of the soil cover is representative of site conditions once this removal action is completed.

Based upon the IEUBK modeling for the Site, the soil lead level predicted for the on-site farmer was 37 mg/kg. Figure 4-1 and Table 4-2 present the outputs of the IEUBK model based on the on-site farmer exposure assumptions. Figure 4-1 is a probability density function showing that the geometric mean blood lead level in the child of the farmer was 4.6 µg/dL (95.3% of the childhood population). Table 4-2 shows the input assumptions that were incorporated into the model run. By trial and error, it was determined that the desired blood lead level in the child was achieved when the soil level (i.e., cleanup criterion) was set to 37 mg/kg. The coupling of the RESRAD model with the IEUBK model resulted in a cleanup goal that is an order of magnitude lower than EPA's standard screening value (400 mg/kg) for residential sites. This overestimation of exposure to lead in on-site soils is due primarily to the conservative exposure assumptions (i.e., intake of vegetables and beef) used as a consequence of being consistent with the RESRAD model. Due to the conservative nature of the exposure model (i.e., it likely overestimates the amount of lead in plants and animals), a safe residential cleanup goal for lead may be higher.

Figure 4-2 shows the probability density function for blood lead in the child of the on-site Urban Resident. The soil cleanup criterion was calculated as 450 mg/kg (Table 4-3).

The adult lead model for the commercial worker on-site predicted a soil cleanup goal of 1,219 mg/kg (Table 4-4).

Calculations for the derivation of the copper cleanup goals for all scenarios are presented in Appendix F.

Table 4-2

Lead Inputs and Results for the On-Site Farmer Scenario

LEAD MODEL Version 0.99d

AIR CONCENTRATION: 0.100 ug Pb/m3 DEFAULT
Indoor AIR Pb Conc: 40.0 percent of outdoor.
Other AIR Parameters:

Age	Time Outdoors (hr)		Vent. Rate (m3/day)	Lung Abs. (%)
0-1	1.0	2.0	32.0	
1-2	2.0	3.0	32.0	
2-3	3.0	5.0	32.0	
3-4	4.0	5.0	32.0	
4-5	4.0	5.0	32.0	
5-6	4.0	7.0	32.0	
6-7	4.0	7.0	32.0	

Diet: alternate diet selected by user as follows:
Home-grown Fruit: 0.213 ug Pb/g 100.0 %
Home-grown Vegetables: 0.000 ug Pb/g 0.0 %
Recreational Fish: 0.012 ug Pb/g 44.0 %
Wild Game: 0.013 ug Pb/g 56.0 %

DRINKING WATER Conc: 15.00 ug Pb/L
WATER Consumption: DEFAULT

SOIL & DUST:
Soil: user varied by year
Dust: user varied by year

Age	Soil (ug Pb/g)	House Dust (ug Pb/g)
0-1	37.0	24.8
1-2	37.0	24.8
2-3	37.0	24.8
3-4	37.0	24.8
4-5	37.0	24.8
5-6	37.0	24.8
6-7	37.0	24.8

PAINT Intake: 0.00 ug Pb/day DEFAULT

MATERNAL CONTRIBUTION: Infant Model
Maternal Blood Conc: 2.50 ug Pb/dL

CALCULATED BLOOD Pb and Pb UPTAKES:

YEAR	Blood Level (ug/dL)	Total Uptake (ug/day)	Soil+Dust Uptake (ug/day)
0.5-1:	4.2	7.77	0.71
1-2:	5.4	13.28	1.09
2-3:	5.0	13.48	1.11
3-4:	4.7	13.54	1.13
4-5:	4.5	13.50	0.84
5-6:	4.4	14.46	0.76
6-7:	4.4	15.95	0.72

YEAR	Diet Uptake (ug/day)	Water Uptake (ug/day)	Paint Uptake (ug/day)	Air Uptake (ug/day)
0.5-1:	5.66	1.37	0.00	0.03
1-2:	8.81	3.33	0.00	0.04
2-3:	8.77	3.53	0.00	0.08
3-4:	8.69	3.65	0.00	0.08
4-5:	8.74	3.83	0.00	0.08
5-6:	9.53	4.06	0.00	0.11
6-7:	10.99	4.12	0.00	0.11

Figure 4-1

Blood Lead Results for the On-Site Farmer Scenario

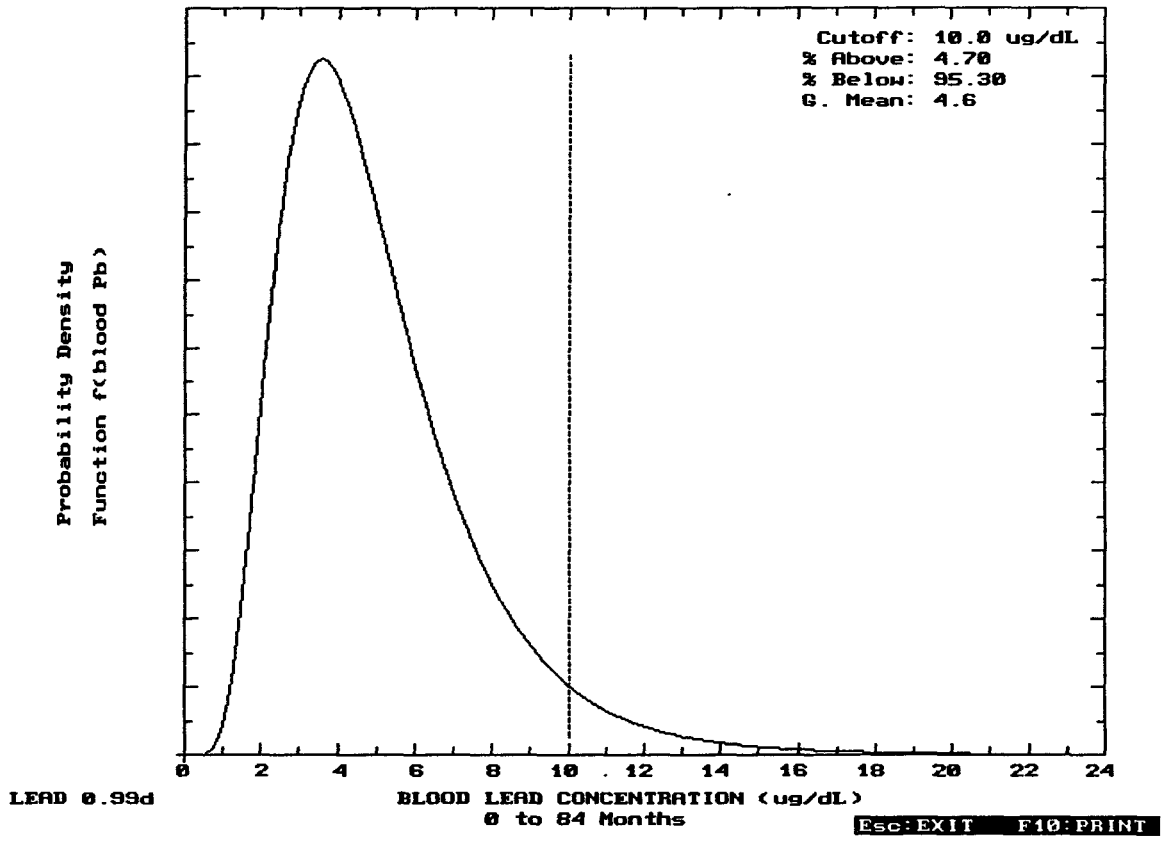


Figure 4-2

Blood Results for the On-Site Resident Scenario

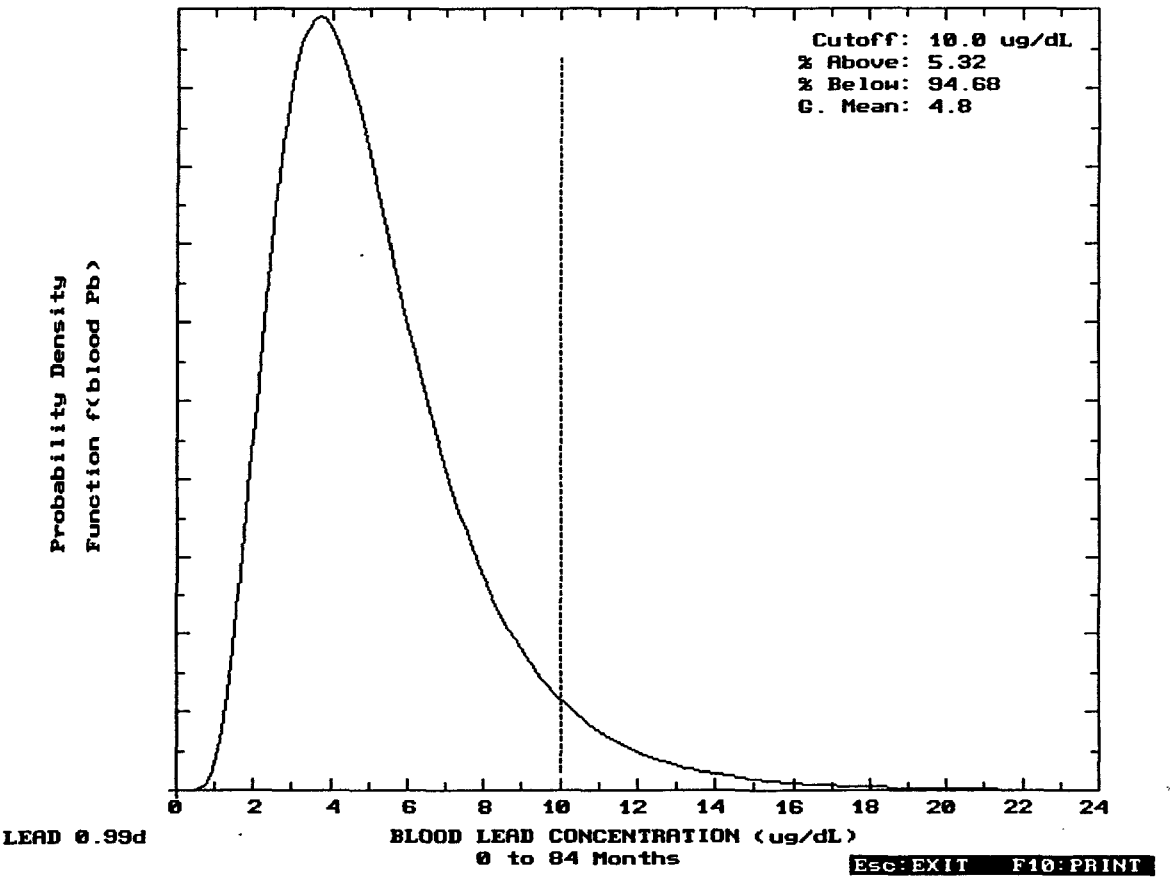


Table 4-3

Lead Inputs and Results for the On-Site Urban Resident Scenario

LEAD MODEL Version 0.99d

AIR CONCENTRATION: 0.100 ug Pb/m3 DEFAULT
Indoor AIR Pb Conc: 40.0 percent of outdoor.
Other AIR Parameters:

Age	Time Outdoors (hr)	Vent. Rate (m3/day)	Lung Abs. (%)
0-1	1.0	2.0	32.0
1-2	2.0	3.0	32.0
2-3	3.0	5.0	32.0
3-4	4.0	5.0	32.0
4-5	4.0	5.0	32.0
5-6	4.0	7.0	32.0
6-7	4.0	7.0	32.0

DIET: DEFAULT

DRINKING WATER Conc: 4.00 ug Pb/L DEFAULT
WATER Consumption: DEFAULT

SOIL & DUST:
Soil: user varied by year
Dust: user varied by year

Age	Soil (ug Pb/g)	House Dust (ug Pb/g)
0-1	450.0	190.0
1-2	450.0	190.0
2-3	450.0	190.0
3-4	450.0	190.0
4-5	450.0	190.0
5-6	450.0	190.0
6-7	450.0	190.0

Additional Dust Sources: None DEFAULT

PAINT Intake: 0.00 ug Pb/day DEFAULT

MATERNAL CONTRIBUTION: Infant Model
Maternal Blood Conc: 2.50 ug Pb/dL

CALCULATED BLOOD Pb and Pb UPTAKES:

YEAR	Blood Level (ug/dL)	Total Uptake (ug/day)	Soil+Dust Uptake (ug/day)
0.5-1:	5.3	9.85	6.99
1-2:	5.9	14.41	10.94
2-3:	5.6	15.02	11.11
3-4:	5.3	15.16	11.29
4-5:	4.4	12.51	8.60
5-6:	3.8	12.02	7.82
6-7:	3.4	11.97	7.42

YEAR	Diet Uptake (ug/day)	Water Uptake (ug/day)	Paint Uptake (ug/day)	Air Uptake (ug/day)
0.5-1:	2.47	0.36	0.00	0.03
1-2:	2.54	0.88	0.00	0.04
2-3:	2.90	0.93	0.00	0.08
3-4:	2.83	0.96	0.00	0.08
4-5:	2.81	1.03	0.00	0.08
5-6:	2.99	1.09	0.00	0.11
6-7:	3.32	1.12	0.00	0.11

Table 4-4

Calculations of Preliminary Remediation Goals (PRGs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Exposure Variable	PRG Equation 1*	PRG Equation 2**	Description of Exposure Variable	Units	Values for Nonresidential Exposure Scenario					
					Using Equation 1		Using Equation 2		Using Equation 2	
					GSD_i = 1.8	GSD_i = 2.1	GSD_i = 1.95	GSD_i = 2.1	GSD_i = 1.8	GSD_i = 2.1
$PbB_{fetal,\ 0.95}$	X	X	95th percentile PbB in fetus	ug/dL	10	10	10	10	10	10
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9	0.9	0.9
BKSF	X	X	Biokinetic slope factor	ug/dL per ug/day	0.4	0.4	0.4	0.4	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	1.8	2.1	1.95	2.1	1.8	2.1
PbB_0	X	X	Baseline PbB	ug/dL	2.0	2.0	2.0	2.0	2.0	2.0
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050	--	--	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0.050	0.050	0.050	0.050
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	0.500	1.000	1.000	1.000
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0.400	0.700	0.700	0.700
$AF_{S,\ D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12	0.12	0.12
$EF_{S,\ D}$[2]	X	X	Exposure frequency (same for soil and dust)	days/yr	219	219	312.5	219	219	219
PRG			Preliminary Remediation Goal	ppm	1,545	888	1,219	888	1,545	888

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}).
When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same PRG.

[2] The averaging time (AT) is a fixed value of 365 days/yr.

***Equation 1, based on Eq. 4 in U.S. EPA (1996).**

$$PRG = \frac{([PbB_{fetal,0.95}/(R*(GSD_i^{1.645})])-PbB_0)*AT}{BKSF*(IR_S*AF_S*EF_S)}$$

****Equation 2, alternate approach based on Eq. 4 and Eq. A-19 in U.S. EPA (1996).**

$$PRG = \frac{([PbB_{fetal,0.95}/(R*(GSD_i^{1.645})])-PbB_0)*AT}{BKSF*([(IR_{S+D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S+D})*(1-W_S)*AF_D*EF_D])}$$

4.3 IDENTIFICATION OF REMOVAL ACTION CLEANUP GOALS

Final removal action cleanup goals are established to ensure that selected remedies are protective of human health and the environment. The site-specific, soil cleanup goals for radiological and non-radiological constituents established in this subsection are the drivers for the response action at the Site. They are shown in Table 4-5. The soil cleanup goals for the Site are as follows:

- U-238 – 35 pCi/g
- Th-232 – 2.8 pCi/g
- Pb Total – 450 mg/kg
- Cu Total – 1,912 mg/kg
- As Total – 7.4 mg/kg

For the most likely future use scenario (Urban Resident), the risk analysis in Section 3 shows that the cleanup levels in Table 4-5 are protective of human health and the environment. As shown in Table 3-9, U-238 at a level of 110 pCi/g would be protective; however, to meet previous DOE commitments, a 35 pCi/g cleanup level is recommended for U-238. The risk analysis showed that the Th-232, Pb total, and Cu total cleanup levels should be 2.8 pCi/g, 450 mg/kg, and 1,912 mg/kg, respectively. The As total cleanup level is based on background soil concentrations.

As noted in Subsection 4.1.1.2, one of the potential ARARs for radiological COCs (10 CFR 20.1403) provides that if institutional controls fail, the average member of the critical group must not be exposed to radiation distinguishable from background in excess of 100 mrem per year. As shown in Table 3-11, the 35 pCi/g cleanup goal for U-238 is associated with the Resident Farmer scenario, which is implicitly associated with unrestricted release and a maximum dose to the average member of the critical group of 25 mrem/year. Thus, even if institutional controls at the Site were to fail, the removal action cleanup goal of 35 pCi/g would still meet that potential ARAR.

The 1.5 pCi/g cleanup goal for Th-232 derived under the Resident Farmer scenario is also associated with an unrestricted release. The Th-232 cleanup goal of 2.8 pCi/g is less than two times the Resident Farmer cleanup criterion. Because dose to the average member of the critical group increases linearly with residual radioactive material concentration in the soil, a failure of institutional controls will not cause dose from Th-232 to increase beyond that specified in the potential ARAR. Thus, both radiological cleanup goals are sufficiently protective to meet the potential ARAR requirements.

Table 4-5

Final Removal Action Cleanup Goals

Contaminant	Cleanup Goal[1]
U-238 (pCi/g)	35
Th-232 (pCi/g)	2.8
Pb total (mg/kg)	450
Cu total (mg/kg)	1,912
As total (mg/kg)	7.4

[1]The cleanup goals were calculated as average concentrations for the Site.

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5. EVALUATION AND ANALYSIS OF REMOVAL ACTION ALTERNATIVES

Removal action alternatives applicable to the Site were developed and evaluated in the 1995 EE/CA. This Technical Memorandum is limited to consideration of two of those alternatives, specifically Alternative 2B and Alternative 3B.

5.1 SELECTION OF REMOVAL ACTION ALTERNATIVES

The 1995 EE/CA identified and screened relevant source and migration control technologies for protection of human health and the environment based on the site-specific contaminants (chemical and radiological) and conditions at the Site. The response action technologies applicable to soil that were retained from this evaluation included:

- No action.
- Institutional controls.
- Surface containment barriers.
- Excavation.
- Treatment (stabilization).
- Off-site disposal at a commercial facility.

The screened technologies identified in the 1995 EE/CA are still applicable to the site at the present time. These technologies were assembled to create a series of alternatives that are discussed in the following subsections.

5.2 IDENTIFICATION OF ACTION ALTERNATIVES

The following response action alternatives for soils were developed in the 1995 EE/CA:

- Alternative 1: No Action.
- Alternative 2A: Large-Scale Excavation of Radiological Materials.
- Alternative 2B: Large-Scale Excavation of Radiological and Hazardous Metal Materials.
- Alternative 3A: Cap and Cover.
- Alternative 3B: Moderate Excavation, Off-Site Disposal of Radioactive Soil, and Cap and Cover.
- Alternative 4A: Large-Scale Excavation, In-Situ Solidification of Radiological Materials.

- Alternative 4B: Large-Scale Excavation, In-Situ Solidification of Radiological and Heavy Metal Materials.

Alternative 3B was selected as the response action alternative for the Site. The major components of Alternative 3B are:

- Removal and off-site disposal of soils containing 100 pCi/g uranium and 15 pCi/g thorium.
- Excavation and on-site placement of soils containing 35 pCi/g to 100 pCi/g uranium and less than 15 pCi/g thorium within an on-site DA.
- Placement of a 6-inch cover of clean soil over the entire site to reduce potential exposures.

This alternative is currently being implemented by USACE; however, in early 1998, it became apparent that the selected alternative did not fully address the non-radiological contaminants of concern (i.e., lead, copper, and arsenic) or the realities associated with construction of an on-site DA. Due to these factors, and the lack of community acceptance of the DA, USACE is now re-evaluating the other response action alternatives presented in the 1995 EE/CA, specifically Alternative 2B.

Descriptions of Alternatives 2B and 3B as they would be implemented to address the removal action cleanup goals identified in Subsection 4.3 are provided in the following subsections.

5.2.1 Alternative 2B – Large-Scale Excavation and Disposal (Radioactive, Organics, Metals)

This alternative would consist of the excavation and off-site disposal of soil and debris at the Site. Radiologically-impacted soil and debris above the cleanup goals would be removed from all depths and metals-impacted soil and debris above the cleanup goals would be removed from 0 – 9 ft bgs. The exposure point concentration was calculated assuming that deep soils would be excavated and brought to the surface during the construction of residential housing. The depth of excavation was assumed to be 8 ft (for a basement) with an additional foot assumed for over-excavation during construction. Deep soils that are excavated are assumed to be used as cover/fill during construction and not considered to be disposed of off site. Mixing of deep soils for dilution of contamination with cleaner near surface soils was not considered.

Excavation activities would be conducted using conventional construction equipment. As indicated in Table 3-13, the total volume of material to be removed is estimated at 58,933 cy under the Urban Resident scenario. Removal and disposal of asphalt paving and concrete slabs from the site is required to enable subsurface excavation of impacted soil. If additional buried drums are encountered during the excavation of soil, they would be repackaged and transported off-site for disposal at the appropriate facility.

The identified, yet unnamed tributary of Patroon Creek that flows through the former lake bed and impacted areas of the site would be diverted around the site during excavation activities.

Following the diversion of the tributary, the area within the immediate vicinity of the existing culvert would be examined. If appropriate, the existing 4-foot diameter culvert that contained the stream would be plugged and abandoned in place.

Because contaminant concentrations in soil beneath the water table exceed radiological and/or metals cleanup goals, a portion of the aquifer would need to be dewatered before and during the project to facilitate excavation of the impacted soil. Cribbing and walers would be installed as necessary to permit excavation of the deep soils. The water from the dewatering system would be treated using the existing wastewater treatment plant. No other groundwater treatment tasks are included under this alternative.

Radiologically-contaminated soils exceeding cleanup goals will be removed to all depths, and metals-contaminated soils exceeding cleanup goals will be excavated to a maximum depth of 9 feet. Confirmatory soil samples would be collected from the exposed surfaces of the excavated areas. If confirmatory results fail the criteria, additional soil would be removed. The process would continue until the soil remaining at the site meets the radiological and metals cleanup goals.

Excavated soils would be managed on-site within dedicated stockpile areas. Soils from the stockpiles would be loaded for off-site disposal unless they fail the Toxicity Characteristic Leaching Procedure (TCLP) test, in which event they would first be treated. On-site treatment of soils failing TCLP would consist of stabilization of the soils using an existing pug mill process that employs a phosphoric acid solution. The stabilization treatment was developed in a treatability study (Kiber, 1999) and proved to be cost-effective in reducing metals levels to less than the Land Disposal Restrictions (LDR)/Universal Treatment Standards (UTS) criteria.

This alternative assumes that radiologically-impacted soil at all depths and metals-impacted soil from 0-9 ft bgs would be excavated and removed for off-site disposal. On-site storage of soil within a DA is not a component of this alternative. As described in Subsection 3.7, soil would be disposed at one of several off-site treatment facilities based upon its radiological and metals characteristics. Radiologically-impacted soils would be transported to the disposal facilities by rail. Facilities previously constructed at the site would be used to load the soil into rail cars. Soil below the radiological release goals, but greater than the metals goals, would be transported by rail and/or truck to RCRA Subtitle C facilities. Conventional construction equipment would be used in the loading operations.

The rail cars and trucks used to transport site materials to the disposal facilities would be inspected for safety before use. The exteriors of containers and vehicles would be checked and decontaminated, if necessary. Shipments would be manifested according to applicable requirements for hazardous materials. Pre-designated routes would be traveled, and an emergency response program would be established for responding to accidents. The transportation of soils from the Site would comply with applicable state and federal regulations.

Following receipt of acceptable confirmation results, excavated areas would be backfilled and restored. Certified clean fill material would be obtained from outside sources, and be placed and compacted in the excavated areas. The fill would be placed to restore the original topography and graded to promote drainage. Finally, the areas would be seeded to provide an erosion control

cover. Due to the extensive excavation required, site restoration would provide an average 2 feet of fill over the excavated areas as cover.

Following completion of site restoration activities, the response action contractor would demobilize from the site. Post-closure activities for this alternative would include:

- Quarterly groundwater monitoring at 10 wells (five in the upper sand unit and five in the lower sand unit).
- Five year CERCLA reviews.

These activities would be conducted over a period of at least 30 years.

5.2.2 Alternative 3B – Moderate Excavation and Cap and Cover

This alternative would be carried out in the same manner as Alternative 2B except that a portion of the soils designated for off-site disposal at the Subtitle C facility for LARM, as defined in Subsection 3.7, would be stored on-site within a DA. The DA would have a maximum height of 24 feet above existing grade elevation and a capacity of approximately 32,400 cy. A composite cover system would be constructed over the DA and would consist of the following (from bottom to top):

- 18 inches of compacted clay.
- 12 oz/sy non-woven geotextile.
- 40 mil smooth PVC geomembrane.
- Drainage net.
- 6 oz/sy non-woven geotextile.
- 24 inches of soil barrier protection layer.
- 6 inches of topsoil.
- Vegetative cover.

Other components of the response action would be identical to those described for Alternative 2B.

Regarding the design of the DA, several alternatives were considered and evaluated by the Colonie Team. The existing design considers factors such as physical constraints, regulatory siting issues and requirements, volume increase of the stabilized soil, and presence of the culvert within the proposed area of the DA. These factors were apparently not all considered in the 1995 EE/CA. As a result, the current design for the DA is for a facility that is approximately twice as large as that proposed by the DOE.

Following completion of the site restoration, post-closure activities for the DA would be initiated. These activities would include:

- Maintenance of the cover system over the DA.

- Quarterly groundwater monitoring at 10 wells (five in the upper sand unit and five in the lower sand unit).
- Five year CERCLA reviews.

These activities would be conducted over a period of at least 30 years.

6. COMPARATIVE ANALYSIS OF ALTERNATIVES AND CONCLUSIONS

This section presents an evaluation and comparison of Alternatives 2B and 3B. This analysis of alternatives uses the nine evaluation criteria specified in the National Contingency Plan (NCP) under 40 CFR 300.430(e)(9)(iii):

- Overall protection of human health and the environment – Involves an assessment based on a composite of factors addressed under other evaluation criteria, including long-term effectiveness, short-term effectiveness, and compliance with ARARs.
- Compliance with ARARs – Evaluates the compliance of an alternative with all contaminant-specific, action-specific, and location-specific ARARs and TBCs.
- Long-term effectiveness – Examines the protection of human health and the environment after construction and implementation of the remedial alternative. This criterion addresses the long-term adequacy, reliability, and permanence of the remedial alternative.
- Reduction of toxicity, mobility, and volume – Examines the effectiveness of the remedial alternative in reducing the toxicity, mobility, and volume of contaminants through treatment.
- Short-term effectiveness – Examines the protection of community, worker health, and environment during construction and implementation of the remedial alternative.
- Implementation – Considers the technical and administrative feasibility of each alternative, as well as availability of required resources. Factors considered in assessing this criterion include required approvals and permits from regulatory agencies, availability of required off-site treatment or disposal services, and availability of necessary labor, equipment, and materials.
- Cost – Involves development and evaluation of the capital cost of construction, equipment, engineering services, and project administration; and O&M costs for labor, spare parts, materials, and administration.
- State concurrence – Identifies the State's apparent preferences or concerns about alternatives.
- Community acceptance – Identifies the community's apparent preferences or concerns about alternatives.

Although the analysis of alternatives using the nine evaluation criteria is not a strict requirement for removal actions, it has been conducted as part of this Technical Memorandum to ensure that this work is consistent with requirements for the final remedy for the Colonie Site.

6.1 COMPARATIVE ANALYSIS OF ALTERNATIVES

The following subsections detail results of the comparative analysis between Alternatives 2B and 3B. Each of the nine NCP criteria is discussed in its own subsection.

6.1.1 Overall Protection of Human Health and the Environment

Alternative 2B would be protective of human health and the environment because site contamination would be removed to risk-based levels or background. Excavated soil would be disposed in off-site engineered facilities designed and operated to prevent human exposures and dispersion to the environment. Regrading of the Site with an average two feet of soil over excavated areas of the Site would further reduce potential future exposures. Under Alternative 2-B, soil would be remediated so that the property would be available for a wide range of future land uses (both residential and industrial).

Alternative 3B would be protective of human health and the environment because site contamination would be removed to risk-based levels or background. Most of the soil would be disposed in off-site engineered facilities designed and operated to prevent human exposures and dispersion to the environment. The impacted soil remaining on-site would be stored in the DA. The composite cover system over the DA would isolate the soil by minimizing infiltration and exposures, and thus prevent human exposures and dispersion to the environment. The presence of the DA at the Site would necessitate deed restrictions and long-term maintenance and groundwater monitoring. Regrading of the Site with at least two feet of soil over excavated areas of the Site would further reduce potential future exposures. Under Alternative 3B, the Site would be available for industrial redevelopment.

An ecological risk assessment is provided in Appendix I. Both Alternatives 2B and 3B are comparable in terms of overall protection of human health and the environment.

6.1.2 Compliance with ARARs

Both Alternatives 2B and 3B would comply with ARARs.

6.1.3 Long-Term Effectiveness and Permanence

Under Alternative 2B, excavation and off-site disposal of impacted soil would be effective and permanent. Off-site disposal would prevent human exposure and eliminate possible dispersion to the environment. Groundwater monitoring will be required because metals-contaminated soils will be left below the water table at the Site. Future residential or industrial usage of the Site would be permitted under this alternative; however, restrictions prohibiting the use of groundwater or the excavation of soil greater than 9 ft bgs would be required.

Under Alternative 3B, excavation and off-site disposal of a large portion of the impacted soil would be effective and permanent. For the DA, long-term maintenance and groundwater monitoring would be required to ensure the permanence and effectiveness of on-site soil storage.

The DA would significantly restrict future usage of the Site because approximately 25% of the land area would be occupied by the DA, and development of the remaining portion of the Site would likely be limited due to the presence of the DA. Restrictions prohibiting the use of groundwater or the excavation of soil greater than 9 ft bgs would also be required.

Alternative 2B offers greater long-term effectiveness and permanence than Alternative 3B because all radioactive soils are removed from the Site and placed in off-site facilities engineered for permanent disposal. Alternative 3B represents a less effective and less permanent solution for reducing risk from radioactive materials because such materials remain buried at the Site over the long-term. The presence of the DA would require a greater level of institutional control and active site maintenance. Breakdowns in security and access restrictions, as well as failure of the cover system, would reduce the long-term adequacy, reliability, and permanence of Alternative 3B. For Alternative 3B, the DA would also restrict and limit future site development.

6.1.4 Reduction of Toxicity, Mobility, and Volume

For Alternatives 2B and 3B, with respect to the excavated soil shipped for off-site disposal, toxicity, mobility, or volume would not be reduced. With respect to the soils stabilized on-site, this treatment will reduce the mobility of metals and slightly increase the volume of soil.

Alternative 2B provides greater reduction of toxicity, mobility, and volume at the Site than Alternative 3B because more impacted soil is removed.

6.1.5 Short-Term Effectiveness

For Alternatives 2B and 3B, potential short-term risks to workers, the community, and the environment could be effectively managed by use of proper construction practices, real-time air monitoring, standard dust suppression techniques, and by following appropriate Department of Transportation (DOT) and state shipping requirements for all transportation activities. The procedures to safely execute these activities would be described in site-specific work plans and health and safety plans.

Alternative 3B poses greater potential for short-term risks in comparison to Alternative 2B because of the activities associated with the construction of the DA.

6.1.6 Implementation

The excavation, treatment, and disposal activities required under Alternatives 2B and 3B are easily implemented. Due to the shallow groundwater table, excavation operations under both alternatives require that dewatering systems and wet construction techniques be used. Such site conditions can be effectively managed, but production rates for excavation are lower than those achievable under dry conditions.

Uncertainties regarding the construction of the DA exist for Alternative 3B. Construction uncertainties for the DA include the shallow water table (i.e., within 5 feet bgs) and insufficient

buffer zones from property boundaries. The existing culvert underlying the area of the proposed DA requires significant effort to reroute the channel and abandon the culvert. These factors contribute to make this site potentially unsuitable for the construction of a waste disposal area.

Labor, equipment, and materials are conventional and readily available. Off-site disposal facilities capable of receiving soils from the Site are available, but are limited in number and are located at great distances from the Site.

Implementation of Alternative 2B is more readily accomplished because of the constructability issues associated with the DA under Alternative 3B.

6.1.7 Costs

The cost estimates for Alternatives 2B and 3B were based on the soil volumes presented in Table 6-1. These quantities were developed with earthVision software using the site characterization data. Soil quantity is the primary factor in determining cost because the major project activities (i.e., excavation, analytical testing, on-site stabilization, off-site transportation and disposal, and site restoration) are directly related to the volume of material removed.

A summary of estimated costs for Alternatives 2B and 3B is provided for each risk scenario in Table 6-2. The major construction activities that comprise the direct construction cost are summarized along with the indirect construction costs and post-closure costs. Excavation production rates have been adjusted for the wet conditions at the Site. The costing assumptions and a detailed breakdown of each cost estimate are presented in Appendix K.

For Alternative 2B, total costs range from $10.0 million (Industrial Worker scenario) to $62.8 million (Resident Farmer scenario). The total costs for the Urban Resident scenario are $18.9 million.

For Alternative 3B, total costs range from $5.4 million (Industrial Worker scenario) to $58.3 million (Resident Farmer scenario). The total costs for the Urban Resident scenario are $14.3 million.

Comparison of the estimated costs for the two alternatives indicates that costs for Alternative 2B range from approximately 8% to 85% higher than the costs for Alternative 3B, depending on the risk scenario. The difference in the costs between the alternatives is related primarily to reduced costs for the storage of 32,400 cy of soil in the DA under Alternative 3B as compared to costs for the off-site transport and disposal of this volume of material under Alternative 2B.

Table 6-1
Estimated In-Situ Volumes of Soil for Off-Site Disposal at the Site

Disposal Facility	In-Situ Soil Volume (cy)[1,2,3]								
	Resident Farmer			Urban Resident			Industrial Worker		
	Designated Area[5]	Eastern Area[5]	Total	Designated Area[5]	Eastern Area[5]	Total	Designated Area[5]	Eastern Area[5]	Total
LLRW	902	60	962	902	60	962	902	60	962
Subtitle C (LARM)[4]	138,710	71,553	210,263	38,239	19,732	57,971	24,500	2,716	27,216
Total	139,612	71,613	211,225	39,141	19,792	58,933	25,402	2,776	28,178

[1]Volumes shown are for Alternative 2B.

[2]Volumes shown do not include over-excavation factor of 5%.

[3]Excavation of metals-impacted soils no greater than 9 ft bgs.

[4]For Alternative 3B, volumes are identical except that Subtitle C (LARM) volume is reduced by on-site storage in the DA (capacity of 32,400 cy).

[5]Term refers to a geographic area of the site as shown on Figure 2-2.

Table 6-2
Summary of Cost Estimates for the Site

Item	Resident Farmer		Urban Resident		Industrial Worker	
	Alternative 2B	Alternative 3B	Alternative 2B	Alternative 3B	Alternative 2B	Alternative 3B
Mobilization & Site Preparation	$0	$0	$0	$0	$0	$0
Removal of Buried Drums	14,151	14,151	14,151	14,151	14,151	14,151
Divert Tributary	121,596	121,596	121,596	121,596	121,596	121,596
Dewater Excavation	602,431	602,431	164,429	174,610	77,124	77,124
Excavation	932,030	932,030	435,178	435,178	335,392	335,392
Characterization of Stockpiled Soils	679,380	679,380	189,610	189,610	90,450	90,450
Soil Stabilization	1,838,711	1,838,711	513,043	512,895	238,423	238,423
Confirmatory Sampling	490,100	490,100	136,880	136,880	65,540	65,540
Additional Excavation	35,344	35,344	9,355	10,394	4,677	4,677
Confirmatory Sampling for Additional Excavation	24,360	24,360	6,960	6,960	3,480	3,480
On-Site Storage of Soil in DA	NA	75,461	NA	75,461	NA	75,461
Construct Composite Cover for DA	NA	247,625	NA	247,625	NA	247,625
Off-Site Soil Transport & Disposal	47,473,484	41,920,059	13,316,028	7,759,428	6,416,291	859,691
Off-Site Disposal (VOC & SVOC Soil)	31,879	31,879	31,887	31,888	31,883	31,888
Groundwater Monitoring Wells	25,000	25,000	25,000	25,000	25,000	25,000
Site Restoration	2,792,101	2,790,291	787,029	785,219	380,982	379,172
Demobilization	20,360	20,360	20,360	20,360	20,360	20,360
Direct Construction Cost	**$55,080,928**	**$49,848,778**	**$15,771,506**	**$10,547,254**	**$7,825,348**	**$2,590,029**
Indirect Construction Cost[1]	**$6,846,696**	**$7,135,848**	**$2,209,932**	**$2,509,045**	**$1,268,154**	**$1,557,306**
Total Construction Cost	**$61,927,624**	**$56,984,626**	**$17,981,438**	**$13,056,299**	**$9,093,502**	**$4,147,335**
Post-Closure Activities (Present Worth)	**875,876**	**$1,266,376**	**875,876**	**$1,266,458**	**875,876**	**$1,266,458**
Total Cost	**$62,803,500**	**$58,251,003**	**$18,857,314**	**$14,322,758**	**$9,969,378**	**$5,413,793**

[1]Indirect Construction Cost calculated as a percentage of Direct Construction Cost less Off-Site Soil Transport & Disposal Cost. Increased cost for Alternative 3B results from additional effort and complexity associated with construction of the DA.

6.1.8 State Concurrence

State concurrence of Alternatives 2B and 3B will be requested when the proposed Action Memorandum is published for public comment.

6.1.9 Community Acceptance

For Alternative 3B, lack of community acceptance has been documented with regard to the anticipated 24-foot height of the DA. The land area occupied by the DA is also a concern in that it limits future use and redevelopment of the Site. Additionally, there is public concern regarding the presence of a waste disposal area permanently located within a developed, urban community. The community will be asked to comment on the recommendations of the proposed Action Memorandum when it is published for public comment.

6.1.10 Summary of Alternative Comparison

The comparative analysis of Alternatives 2B and 3B is presented in summary in Table 6-3.

6.2 CONCLUSIONS AND RECOMMENDATIONS

6.2.1 Exposure/Land Use Scenario

The soil cleanup goals for the various land use scenarios at the Site are summarized in Table 6-4. These cleanup goals are protective of human health and the environment given the identified land use. This Technical Memorandum recommends the Urban Resident scenario as the exposure scenario for the Site. The Urban Resident scenario provides future land use for both residential and industrial development. This future use scenario is the one most consistent with the existing land use in the vicinity of the Site.

The recommended soil cleanup goals for the Site are presented in Table 6-5. These levels are identical to the cleanup goals for the Urban Resident scenario with the exception of the goal for U-238. Based on the risk analysis, U-238 at a level of 110 pCi/g would be protective; however, to meet the previous DOE commitments, a 35 pCi/g cleanup level for U-238 is recommended. As indicated in Table 6-5, the cleanup goals are equivalent to the 1995 DOE goal for U-238, and more stringent than the 1995 DOE goals for Th-232, Pb total, and Cu total.

The estimated in-situ volumes of soil requiring off-site disposal using the recommended scenario and soil cleanup goals are presented in Table 6-6. Radiologically-impacted soil at all depths and metals-impacted soil up to 9 feet bgs would be removed. The estimated costs for the recommended scenario and cleanup goals are summarized in Table 6-7 and are comparable to the costs for the Urban Resident scenario (5% higher). The increase in cost for the recommended

Table 6-3
Summary of Comparative Analysis for the Site

Criteria	Alternative 2B: Large-Scale Excavation and Disposal (Radiological, Organics, and Metals)	Alternative 3B: Moderate Excavation and Cap and Cover
Overall Protection of Human Health and the Environment	Protective	Protective
Compliance with ARARs	Complies	Complies
Long-Term Effectiveness and Permanence	More effective	Effective
Reduction of Toxicity, Mobility, and Volume	Comparable reduction	Comparable reduction
Short-Term Effectiveness	More effective	Effective
Implementation	More easily implemented	Constructability issues associated with DA
Costs Resident Farmer Scenario Urban Resident Scenario Industrial Worker Scenario	 $62.8 million $18.9 million $10.0 million	 $58.3 million $14.3 million $5.4 million
State Concurrence	Evaluate as part of public comment	Evaluate as part of public comment
Community Acceptance	Evaluate after public comment	Issues with height of DA, evaluate after public comment

Table 6-4
Summary of Cleanup Criteria for Land Use Scenarios

Contaminant	Resident Farmer	Urban Resident	Industrial Worker	Off-Site Groundwater
U-238 (pCi/g)[1]	37	1,373 110 [2]	4,024 110 [2]	110
Th-232 (pCi/g)[1]	1.5	2.8	7.6	N/A
Pb Total (mg/kg)	37	450	1,219	N/A
Cu Total (mg/kg)	194	1,912	51,150 9,457 [2]	9,457
As Total (mg/kg)	7.4	7.4	7.4	N/A

[1]Cleanup goals represent values in excess of background.

[2]Protection of off-site groundwater is the controlling factor in determining cleanup criteria for this scenario.

Table 6-5
Comparison of DOE Criteria vs. USACE Selected Criteria

Contaminant	1995 DOE Cleanup Criteria[1]	USACE Selected Cleanup Criteria[2]
U-238 (pCi/g)[3]	35	35
Th-232 (pCi/g)[3]	15	2.8
Pb Total (mg/kg)	500	450
Cu Total (mg/kg)	10,000	1,912
As Total (mg/kg)	N/A	7.4

[1]The DOE goals were based on a mixture of residential and industrial/commercial land use.

[2]The USACE cleanup goals are based on an urban residential land use.

[3]Cleanup goals represent values in excess of background.

Table 6-6
Estimated In-Situ Volumes of Soil for Off-Site Disposal at the Site: Recommended Scenario

Disposal Facility	In-Situ Soil Volume (cy)[1,2,3,4]		
	Designated Area[6]	Eastern Area[6]	Total
LLRW	902	60	962
Subtitle C (LARM)[5]	40,864	20,324	61,188
Total	41,766	20,384	62,150

[1]Volumes shown are for Alternative 2B.

[2]Volumes shown do not include over-excavation factor of 5%.

[3]Excavation of metals-impacted soils no greater than 9 ft bgs.

[4]Increased volumes as compared to Urban Resident scenario result from reduction of U-238 cleanup goal from 110 pCi/g to 35 pCi/g.

[5]For Alternative 3B, volumes are identical except that Subtitle C (LARM) volume is reduced by on-site storage in the DA (capacity of 32,400 cy).

[6]Term refers to a geographic area of the site as shown on Figure 2-2.

Table 6-7
Summary of Cost Estimates for the Site: Recommended Scenario

Item	Recommended Scenario	
	Alternative 2B	Alternative 3B
Mobilization & Site Preparation	$0	$0
Removal of Buried Drums	14,151	14,151
Divert Tributary	121,596	121,596
Dewater Excavation	174,610	174,610
Excavation	447,651	447,651
Characterization of Stockpiled Soils	199,660	199,660
Soil Stabilization	527,485	527,485
Confirmatory Sampling	144,420	144,420
Additional Excavation	9,355	12,473
Confirmatory Sampling for Additional Excavation	6,960	6,960
On-Site Storage of Soil in DA	NA	75,461
Construct Composite Cover for DA	NA	247,625
Off-Site Soil Transport & Disposal	14,036,367	8,479,767
Off-Site Disposal (VOC & SVOC Soil)	31,888	31,875
Groundwater Monitoring Wells	25,000	25,000
Site Restoration	828,140	826,330
Demobilization	20,360	20,360
Direct Construction Cost	**$16,587,643**	**$11,355,424**
Indirect Construction Cost[1]	**$2,296,152**	**$2,588,094**
Total Construction Cost	**$18,883,795**	**$13,943,518**
Post-Closure Activities (Present Worth)	**875,876**	**$1,266,458**
Total Cost	**$19,759,671**	**$15,209,976**

[1]Indirect Construction Cost calculated as a percentage of Direct Construction Cost less Off-Site Soil Transport & Disposal Cost. Increased cost for Alternative 3B results from additional effort and complexity associated with construction of the DA.

scenario over the urban resident scenario results from the reduction of the U-238 cleanup goal from 110 pCi/g to 35 pCi/g (cleanup goals for other contaminants of concern are identical).

6.2.2 Response Action Alternative

This Technical Memorandum recommends Alternative 2B, Large-Scale Excavation and Disposal as the response action alternative for radiological and chemically impacted soils at the Site. This alternative meets all of the criteria used to evaluate the alternatives.

Alternative 2B is recommended over Alternative 3B because impacted soils are removed from the Site and long-term storage of soil on-site within the DA is not a component of this action. As a result, Alternative 2B provides greater long-term effectiveness and permanence, greater short-term effectiveness, and greater ease of implementation in comparison to Alternative 3B. Additionally, it is anticipated that Alternative 2B will be more acceptable to the community than Alternative 3B. Because there is no DA at the Site under Alternative 2B, this alternative also offers the advantage of a wider range of potential future uses for the Site.

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APPENDIX A:

Groundwater Well Information Table

Appendix A:
Information Collected about Colonie Site Wells

Well No.	*Description*	*Year Installed*	*Depth (ft)*	*Old name*	*Screen Start (ft bgs)*	*Screen Stop (ft bgs)*	*Screen Length (ft)*
B39W01M	Downgradient lower sand	1984	39.4	CISS-4	34.4	39.4	5
B39W01S	Downgradient upper sand	1984	22	CISS-5	11.5	16.5	5
B39W02M	Upgradient lower sand	1988	49		41.7	46.7	5
B39W02S	Upgradient upper sand	1988	25		18	23	5
B39W05M		1994					
B39W05S	Downgradient upper sand	1984	22	CISS-6	13.1	18.1	5
B39W06S	Upper Sand	1988	12.7		6.9	11.9	5
B39W07S	Downgradient upper sand	1988	16		10.3	15.3	5
B39W08M	Upgradient lower sand	1984	42.7	CISS-3	35.6	40.6	5
B39W08S	Upgradient upper sand	1984	14	CISS-1	6	11	5
B39W09S	Upper Sand	1988	17		11.3	16.3	5
B39W10M	Downgradient lower sand (offsite)	1988	30		24.6	29.6	5
B39W10S	Downgradient upper sand (offsite)	1988	16		7.1	12.1	5
B39W14M	Upgradient lower sand	1988	27.5		20.2	25.2	5
B39W14S	Upgradient upper sand	1988	10		4	9	5
B39W15S	Well (1985 Bechtel Report)	1984	19.9	CISS-11	12.6	17.6	5
B39W16M		1994					
B39W18M	lower sand	1988	39		29.4	34.4	5
B39W18S	Downgradient upper sand	1984	20	CISS-7	12.2	17.2	5
B39W19M	lower sand	1994					
B39W19S		1988	26		19.4	24.4	5
B39W21M		1993			Paleo Channel	Base	
B39W21S	paleochannel	1993			Paleo Channel	Surface	
B39W25M		1994					
B1 (19M)	National Lead Well	1982	36				
B2 (16M)	National Lead Well	1982	36				
B3 (5M)	National Lead Well	1982	29.3				
B4 (13s EECA 1-15)	National Lead Well	1982	31				
CISS-2	Borehole (not screened across any unit)	1984	70	NA	NA	NA	NA
CISS-10	Borehole (not screened across any unit)	1984	65	NA	NA	NA	NA
CISS-8	Borehole (not screened across any unit)	1984	71.5	NA	NA	NA	NA
CISS-12	Borehole (not screened across any unit)	1984	71.5	NA	NA	NA	NA
B39W01D	Borehole a well?						
B39W08D	Borehole a well?		164	B39G09			
B39W18D	Borehole a well?			B39G18			
	Total installed in 1984	7					
	Total installed in 1988	11					

Note: Blank spaces indicate no information collected or available.

APPENDIX B:

Health Effects of Chemicals of Potential Concern

APPENDIX B

HEALTH EFFECTS OF CHEMICALS OF POTENTIAL CONCERN

B.1 RADIOLOGICAL

The radiological COCs, uranium and thorium, are radioactive. These elements are naturally present in the environment, primarily in the earth's crust and soils in concentrations ranging from a few tenths of a pCi/g to several tens of pCi/g. In addition, the element's daughter progeny will also be present in undisturbed soils. These progeny may not, however, be present in materials produced during the manufacture of goods containing uranium and thorium.

The presence of thorium and uranium waste products produced during manufacturing processes may result in these elements being distributed in the soils and groundwater in the vicinity of the factories using these materials. Consequently, these radioactive materials may become entrained in groundwater and other pathways that lead to their presence in the environment and ultimately in foodstuffs.

These COCs are considered to be carcinogenic in nature by the EPA (EPA, 1997). The concentrations of these materials in soils remaining after remediation must be lessened to achieve a level of risk within the 10^{-4} to 10^{-6} carcinogenic risk range based upon the reasonable maximum exposure for an individual.

Additionally, the NRC radiological risk criteria set forth by 10 CFR Part 20 Subpart E "Radiological Criteria for License Termination," Section 20.1402, sets the acceptable dose limit to an average member of the critical group that does not exceed 25 mrem per year from sites which have been released for unrestricted use. Appendix B provides additional Subpart E information.

Uranium and thorium also have non-cancer toxicity effects. The permissible intake levels for soluble uranium compounds are based on chemical toxicity, while the permissible intake level for insoluble compounds is based on radiotoxicity. Uranium compounds at CISS are assumed to be insoluble based on the fact that uranium is not detected in groundwater. The high chemical toxicity of uranium and its salts is largely shown in kidney damage, which may not be reversible. Acute arterial lesions may occur after acute exposures. Permissible intake levels for thorium are always based on its radiotoxicity because it has a very low chemical toxicity. Prolonged and repeated skin contact with thorium may cause dermatitis.

B.2 NONRADIOLOGICAL

B.2.1 Arsenic

Inorganic arsenic is primarily toxic by the inhalation and oral routes. Humans exposed to arsenic near hazardous waste sites could inhale arsenic dust in the air; ingest it in water, food, or soil; or

contact it dermally in soil or water. The greatest effect via inhalation is the increased risk of lung cancer. Orally, the effects most likely to be seen are gastrointestinal irritation, nerve and blood problems, and a group of skin diseases, including cancer. The main effect of direct dermal contact with inorganic arsenic is local irritation and dermatitis.

Acute exposure to arsenic has caused death due to heart and lung failure, while death caused by repeated exposure has resulted from the failure of more than one tissue injured by arsenic. Inhalation of inorganic arsenic dusts (mainly arsenic trioxide) irritates the nasal passages; however, workers exposed to high levels of arsenic trioxide in air have usually shown no signs of chronic respiratory functional impairment. Injuries to the lung have been more pronounced following high (near lethal) oral doses. Orally, long-term exposure to low levels of inorganic arsenic has resulted in "Blackfoot disease" and gangrene. Both acute high dose and repeated low dose exposures can cause irritation of the gastrointestinal tract. Similar effects have been observed with subchronic or chronic inhalation exposure. Anemia and leukopenia are common observations in humans exposed to inorganic arsenic by the oral and inhalation routes. Kidney effects, largely vascular in origin, were found in humans orally exposed to inorganic arsenic. Skin lesions are an early sign of chronic oral exposure to inorganic arsenic. Certain lesions (i.e., hyperkeratinized corns) may develop into skin cancer.

Neurological effects are common in humans exposed orally to arsenic and have been reported in some workers exposed by inhalation. Acute high doses lead to brain dysfunction, which can end in seizures and coma in more severe cases. Peripheral nerve damage has occurred with lower-level exposure. Human data indicate that exposure to inorganic arsenic increases the chances of developing cancer. Lung cancer is the predominant effect by the inhalation route; some tumors have been observed at other sites. Increased skin cancer incidence has been observed in several populations consuming drinking water with high arsenic concentrations. Based on these findings, the EPA has categorized arsenic in Group A, human carcinogen.

B.2.2 Copper

Adverse effects from oral copper exposure have been reported to occur in the gastrointestinal tract (stomach, intestines), liver, blood, muscles, bones, heart, blood vessels, kidney, and the developing fetus. Following chronic, low-dose oral exposure, the gastrointestinal tract appears to be the most sensitive tissue (i.e., the organ or tissue showing toxicity at the lowest tested dose level). Other tissues or organs show signs of toxicity at higher doses. Minor adverse effects on the reproductive system have been noted following oral exposure to copper. Mortality has been noted after high doses of copper were included in the diets of laboratory animals. Deaths were attributed to anorexia and extensive centrilobular necrosis. Gastrointestinal effects were associated with mucosal hyperplasia of the forestomach. Liver effects were associated with centrilobular necrosis and inflammatory foci, significant increases in serum enzymes, and chronic hepatitis with regeneration of parenchymal tissue. Hematological effects were associated with decreased hemoglobin and hematocrit values. Musculoskeletal effects were associated with depressed skeletal growth. Kidney effects were associated with necrosis of the renal tubules and extensive degenerative changes in the proximal tubules. Developmental effects were associated with increased fetal mortality as well as developmental abnormalities in offspring. Minor reproductive effects were associated with significant increases in testes weights of male rats.

Other reproductive parameters, including length of gestation, number of offspring, and average offspring weight, were not adversely affected.

B.2.3 Lead

Acute lead poisoning (overdose) is infrequent now as opposed to 20 or 30 years ago because of current regulations that limit lead content of paint and gasoline, and because workers are more closely monitored in the workplace. Ingestion by mouth is the primary cause of acute lead poisoning in humans (children are more susceptible than adults). There are no studies reported on acute lead poisoning in humans from inhalation or dermal exposure (ATSDR, 1993); however, EPA recently lowered the acceptable levels of lead in drinking water, thus creating a more-severe condition.

Children are more susceptible to lead toxicity than adults because they engage in physical activities associated with significant hand-to-mouth ingestion of nonfood items containing lead, and are physiologically more prone than adults to develop high circulating blood levels following exposure. Bone acts as a repository for ingested and inhaled lead, and may be a source of blood lead during growth, pregnancy, disease, or stress. No systemic toxicity from chronic lead exposure is estimated to occur if the lifetime daily intake is less than 0.3 mg (Lippman, 1989) (EPA, 1989) (Mushak, 1989).

Genotoxic and cancer-causing effects of lead in human and animal studies are the subject of current debate. The only consistent reports of lead genotoxicity come from plant studies. Reports of kidney tumors have been reported in animals and humans; however, human tumor incidence is not statistically significant. Environmental lead exposures and potentially cancer-causing doses of lead have been difficult to measure in human epidemiological studies. Based on sufficient animal evidence, EPA has categorized lead as a Group B2, probable, human carcinogen.

The most sensitive target in children for the adverse noncancer effects of lead is the nervous system. For adults, it is the blood and heart. EPA and the Centers for Disease Control and Prevention (CDC) have developed a range of blood lead levels that may be associated with specific toxic effects. Toxicity can range from subtle neurobehavioral effects in children (e.g., decreased learning performance, small deficits in intelligence scores; 10-15 μg/dL) to severe brain damage in adults or children (80-100 μg/dL). Both prenatal and postnatal lead exposures are influential on postnatal neurobehavioral performance. The critical toxic effect in middle-aged adult males is high blood pressure (5 to 30 μg/dL). Lead may also affect a variety of other organs at intermediate blood levels. Kidney damage, anemia (similar to that caused by iron deficiency), muscle paralysis, and severe vomiting and stomach pain may occur. Effects on the human immune system are inconsistent; positive results tend to be at high blood lead levels. Encephalopathy (brain swelling) is the most life-threatening effect of lead toxicity, and typically occurs at blood levels of 80 μg/dL or higher. Severe lead toxicity may cause sterility, abortion, and infant mortality.

The EPA states that nervous system effects in children are the primary concern from typical chronic exposures because they can occur at very low exposure and blood levels. Although lead can cause cancer in animals, the U.S. EPA has not classified lead with regard to its carcinogenic potential. Furthermore, cancer-causing doses of lead in animal studies are very high compared with doses of many other chemicals known to produce cancer in animals.

To protect the public from environmental lead exposure, government regulatory agencies such as the U.S. EPA have set scientific standards (e.g., allowable air emissions from factories) that are developed to prevent chronic exposure and toxicity from lead in humans. Breathing of lead from the air is generally considered to be a minor contribution to overall lead intake in the U.S. population (Goyer, 1991). The bulk of lead intake is thought to be due primarily to indirect sources, such as soil ingestion and food consumption (ATSDR, 1993). In developing air standards for lead, the U.S. EPA has considered adverse health effects that would occur as a result of the material falling on the ground from the air emissions. The margin of safety incorporated into the National Ambient Air Quality Standard (NAAQS) for lead is based partly on consideration of risk of adverse health effects from non-inhalation exposures, such as the mouthing behavior of children.

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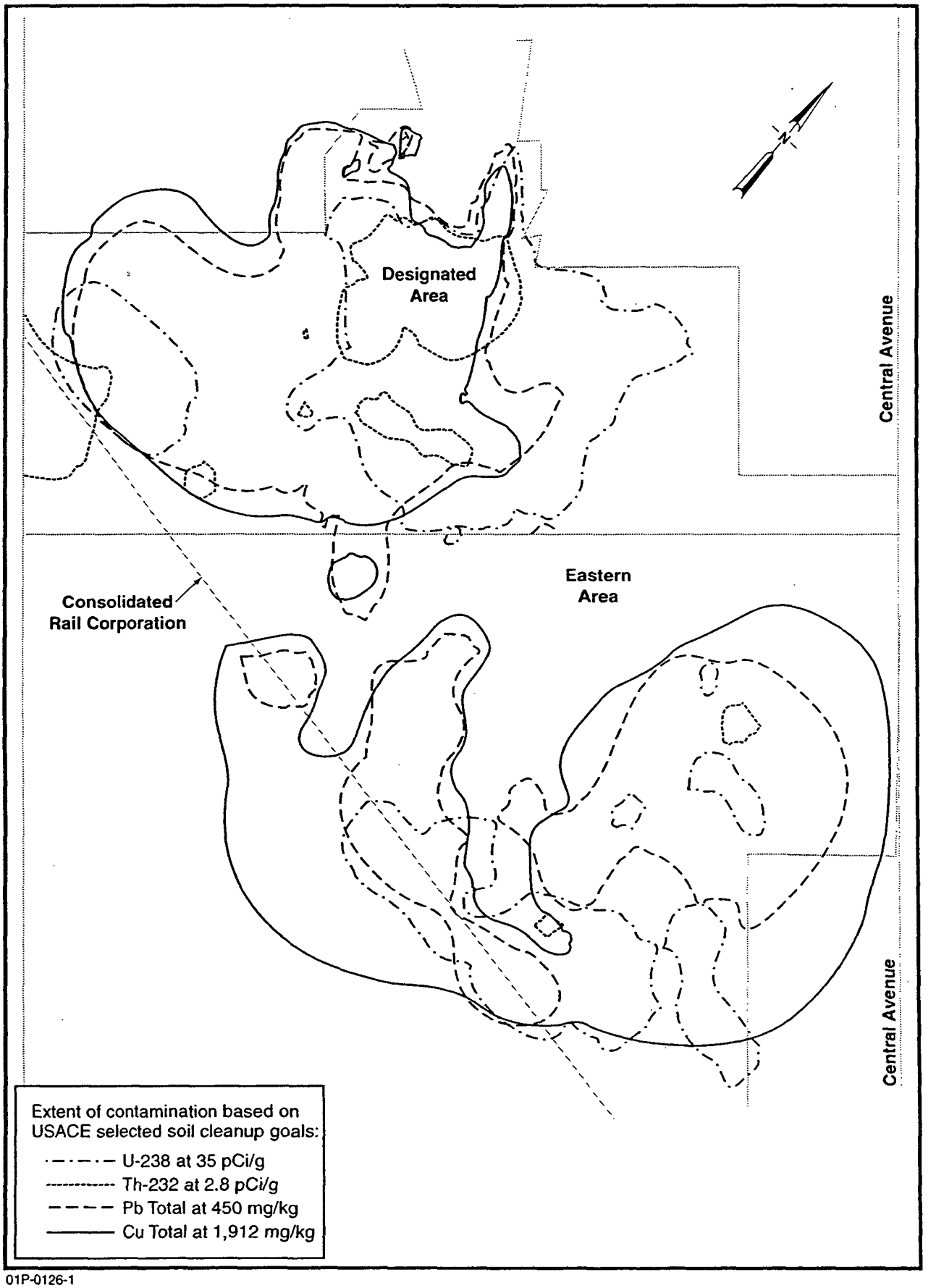
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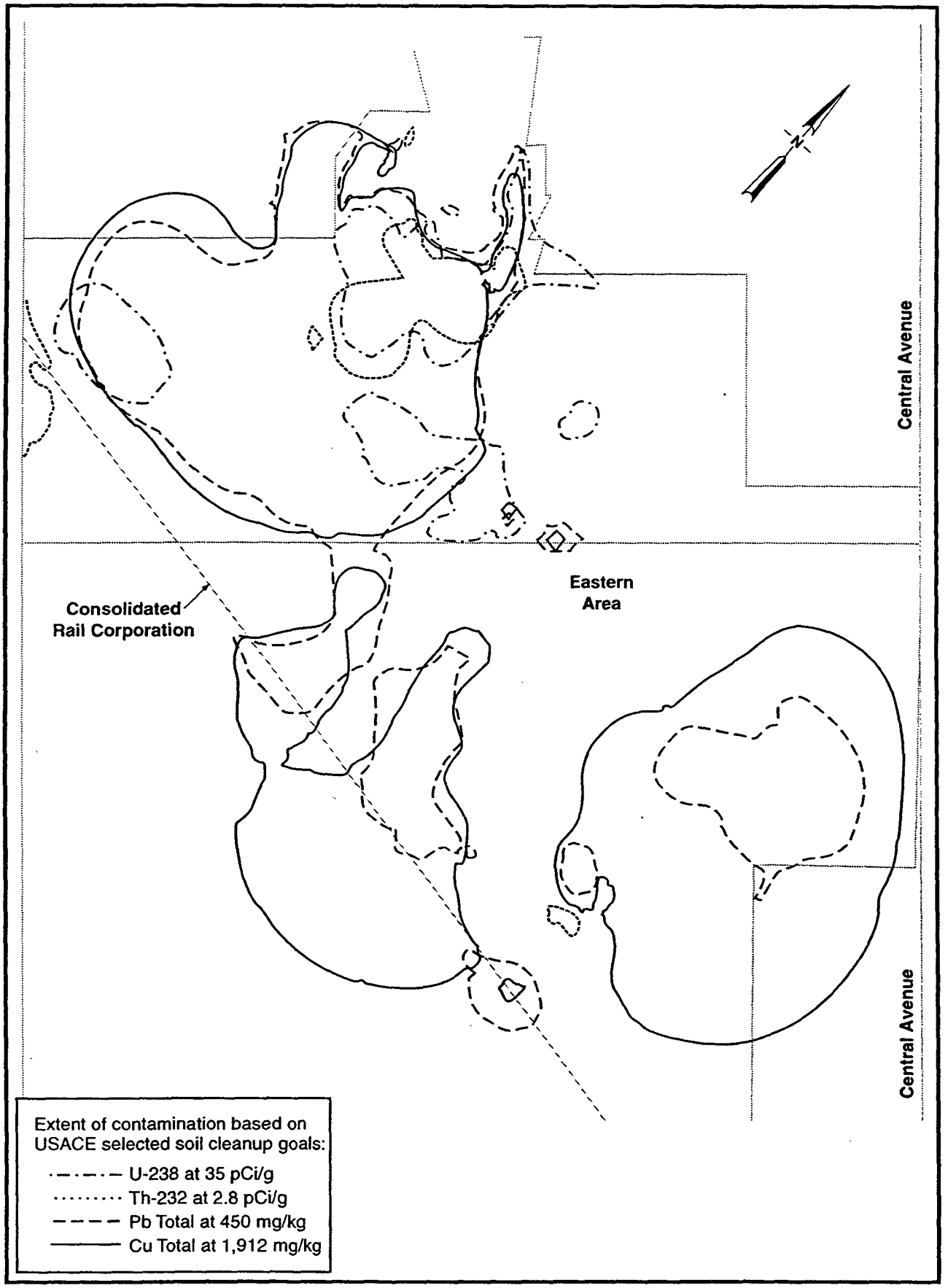
APPENDIX C:

Co-Location of Primary Contaminants



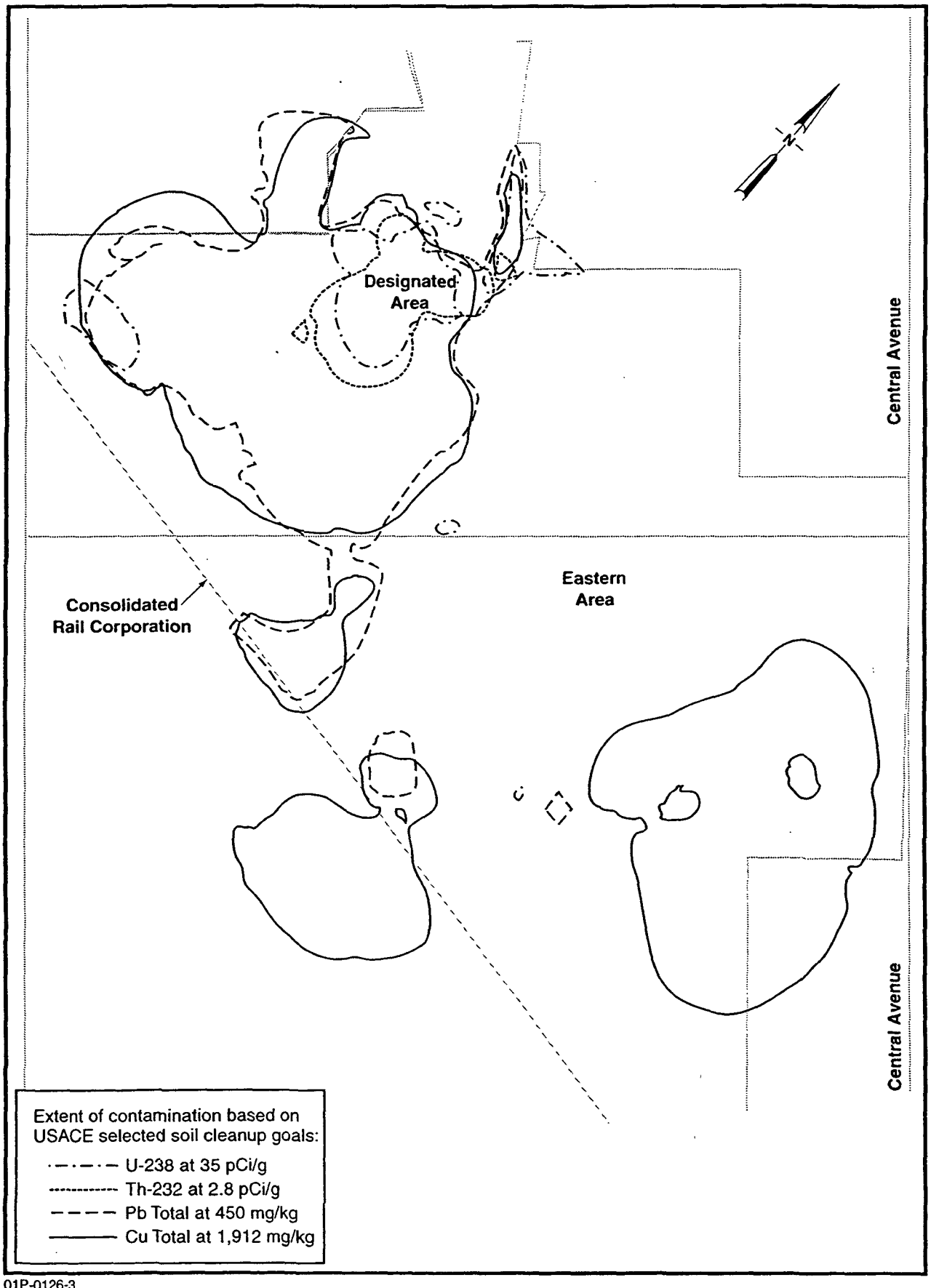
01P-0126-1

FIGURE 1 CO-LOCATION OF PRIMARY CONTAMINANTS AT THE COLONIE SITE: RESPONSE ACTION DRIVERS, 0-2 FT



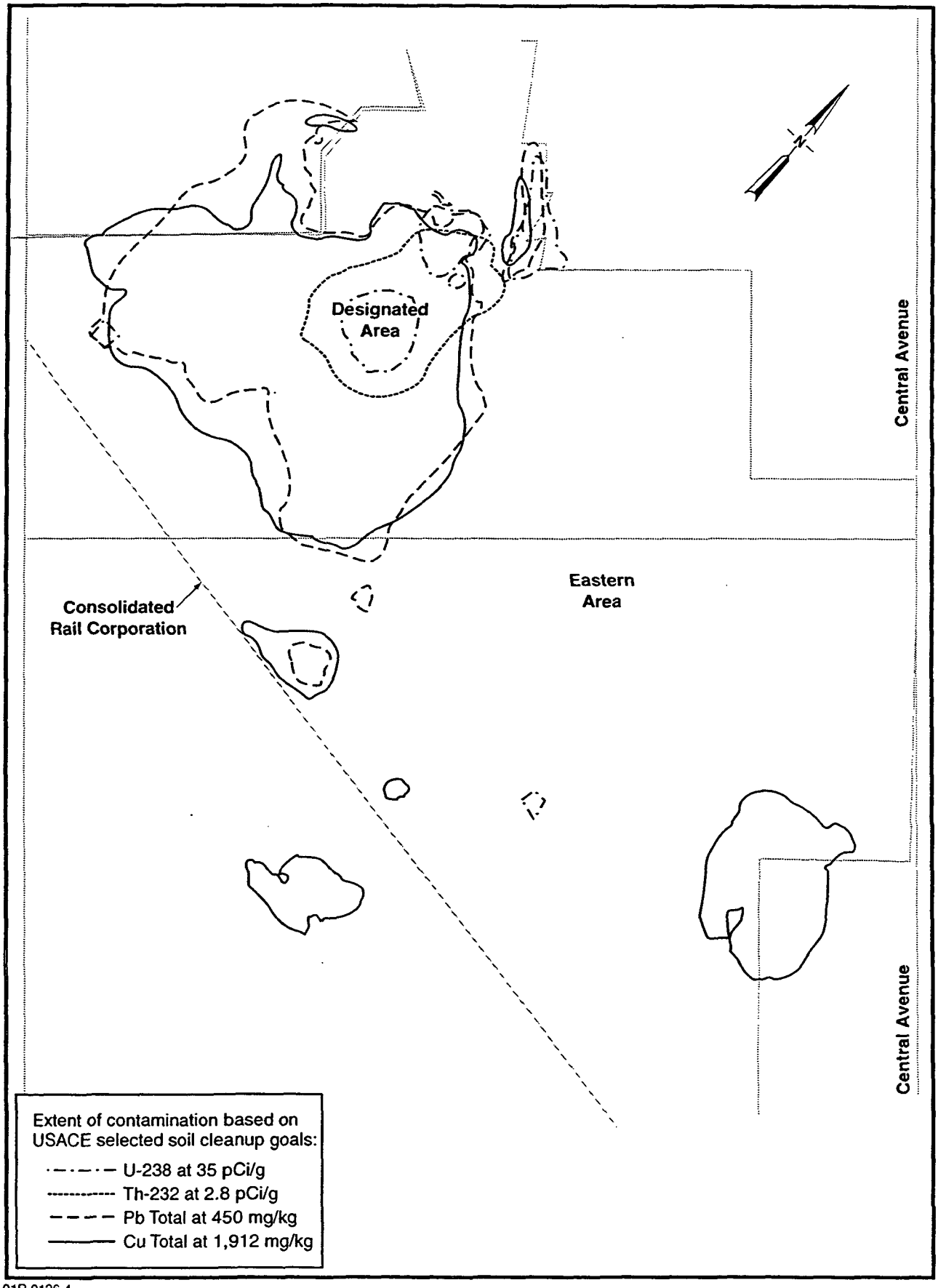
01P-0126-2

FIGURE 2 CO-LOCATION OF PRIMARY CONTAMINANTS AT THE COLONIE SITE: RESPONSE ACTION DRIVERS, 2-4 FT



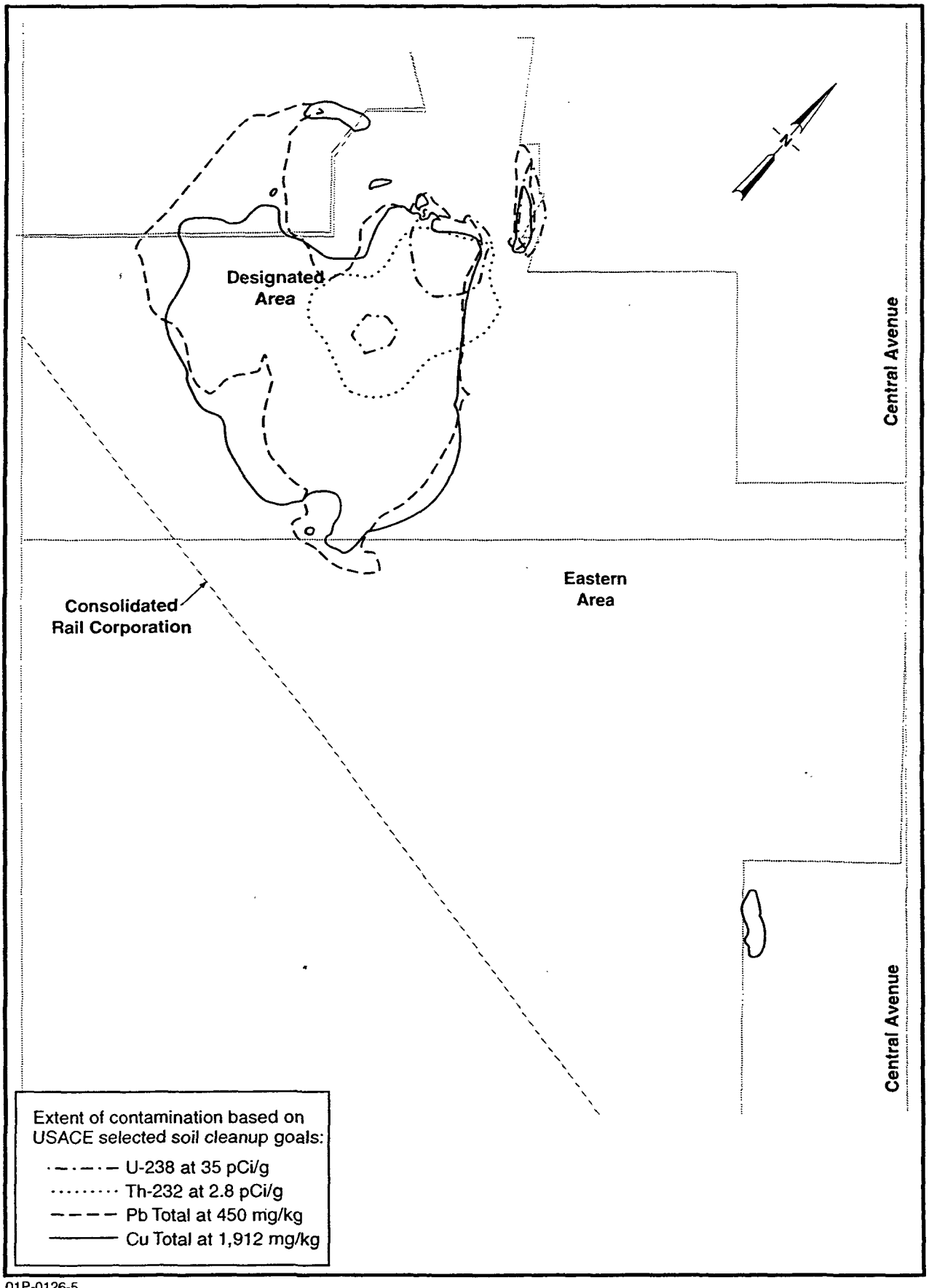
01P-0126-3

FIGURE 3 CO-LOCATION OF PRIMARY CONTAMINANTS AT THE COLONIE SITE: RESPONSE ACTION DRIVERS, 4-6 FT



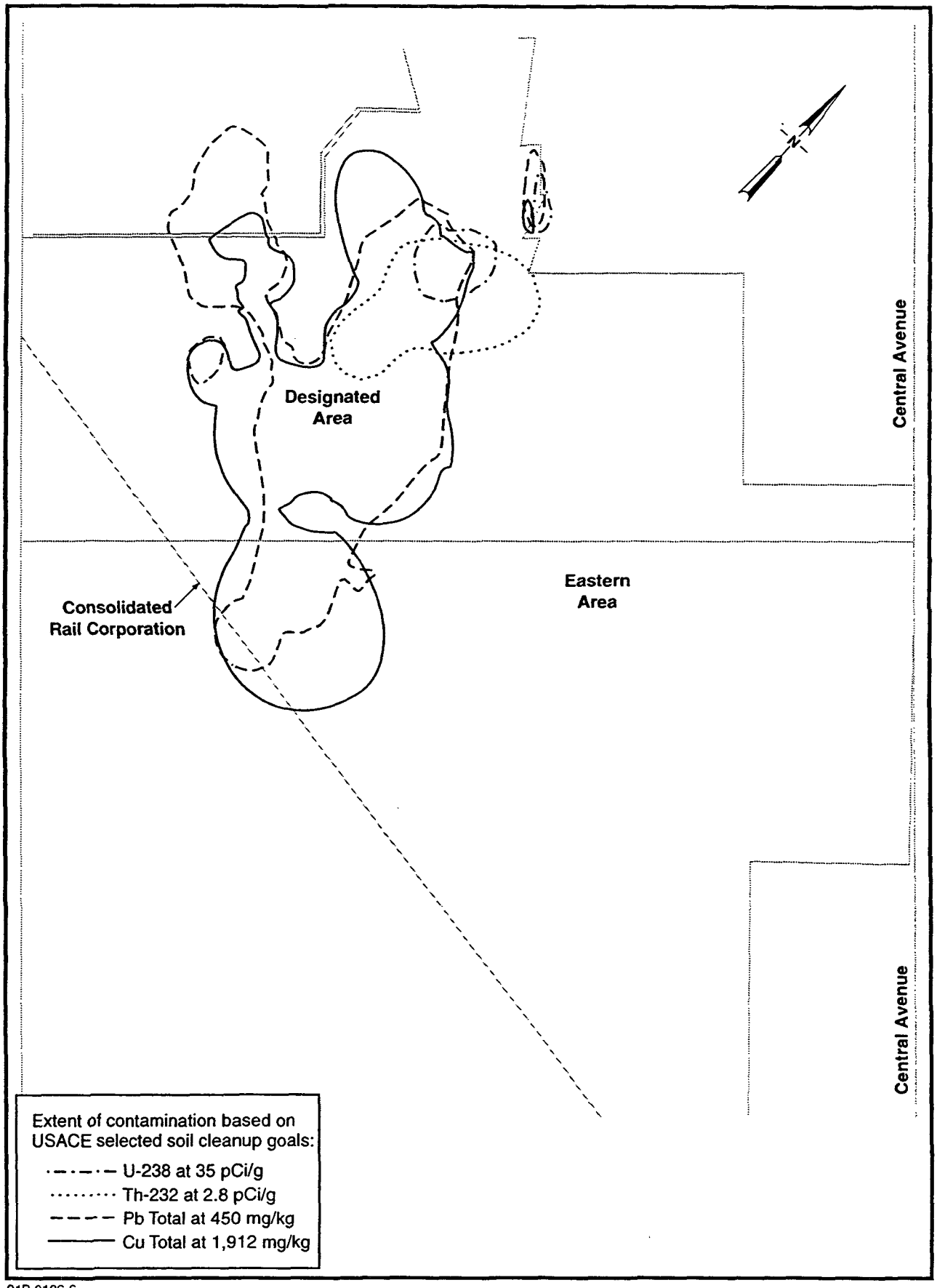
01P-0126-4

FIGURE 4 CO-LOCATION OF PRIMARY CONTAMINANTS AT THE COLONIE SITE: RESPONSE ACTION DRIVERS, 6-8 FT



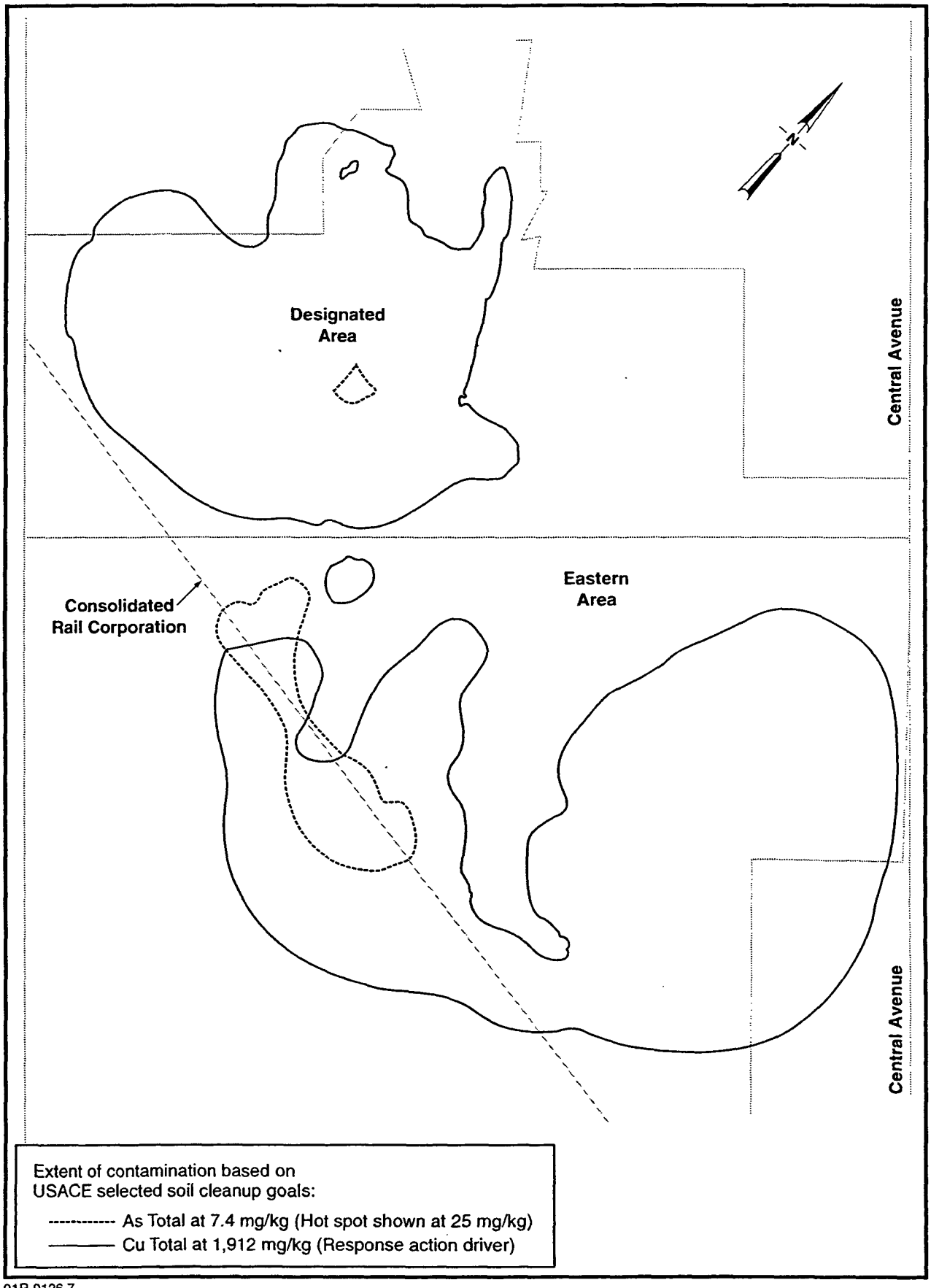
01P-0126-5

FIGURE 5 CO-LOCATION OF PRIMARY CONTAMINANTS AT THE COLONIE SITE: RESPONSE ACTION DRIVERS, 8-10 FT



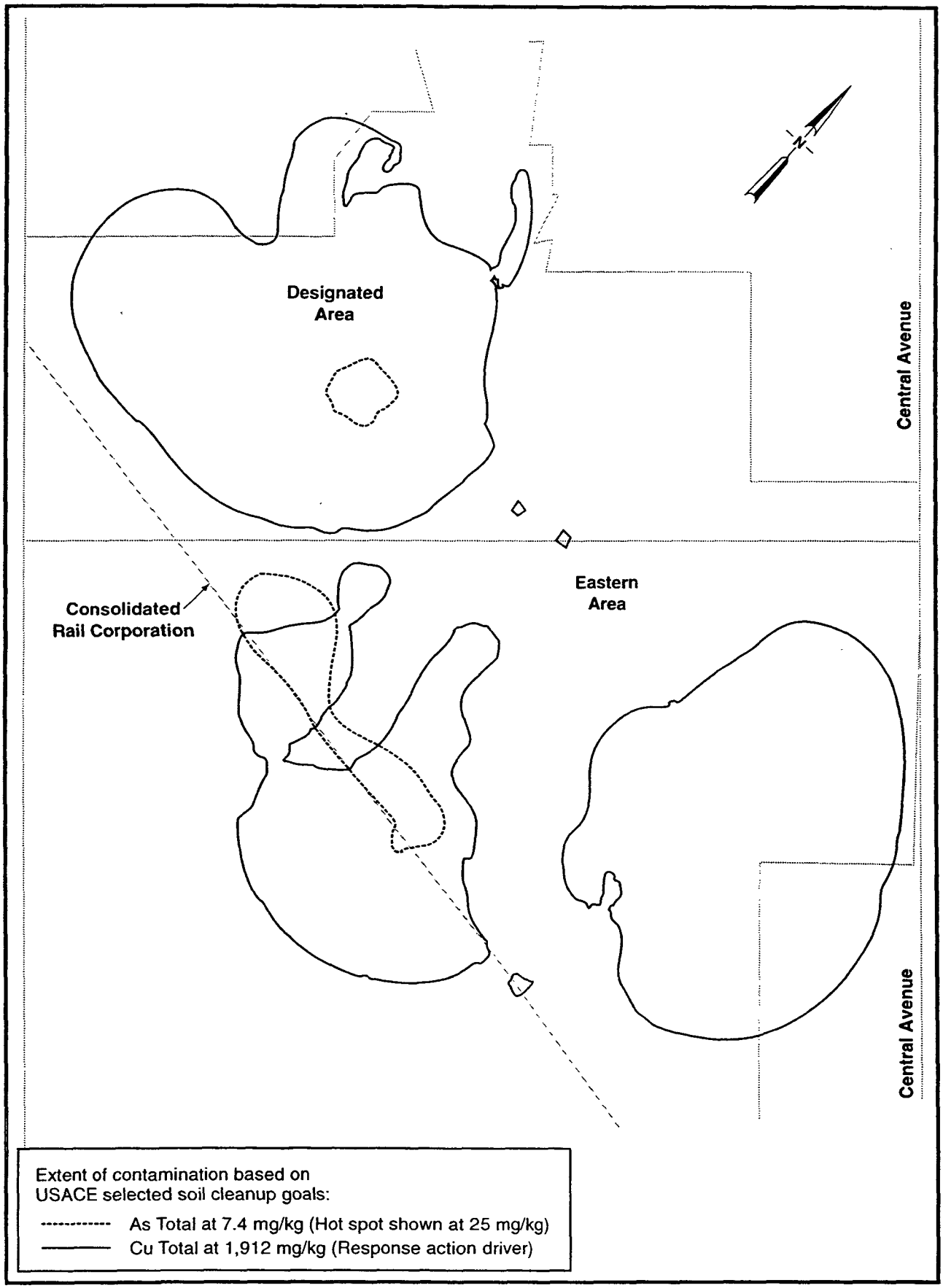
01P-0126-6

FIGURE 6 CO-LOCATION OF PRIMARY CONTAMINANTS AT THE COLONIE SITE: RESPONSE ACTION DRIVERS, BELOW 10 FT



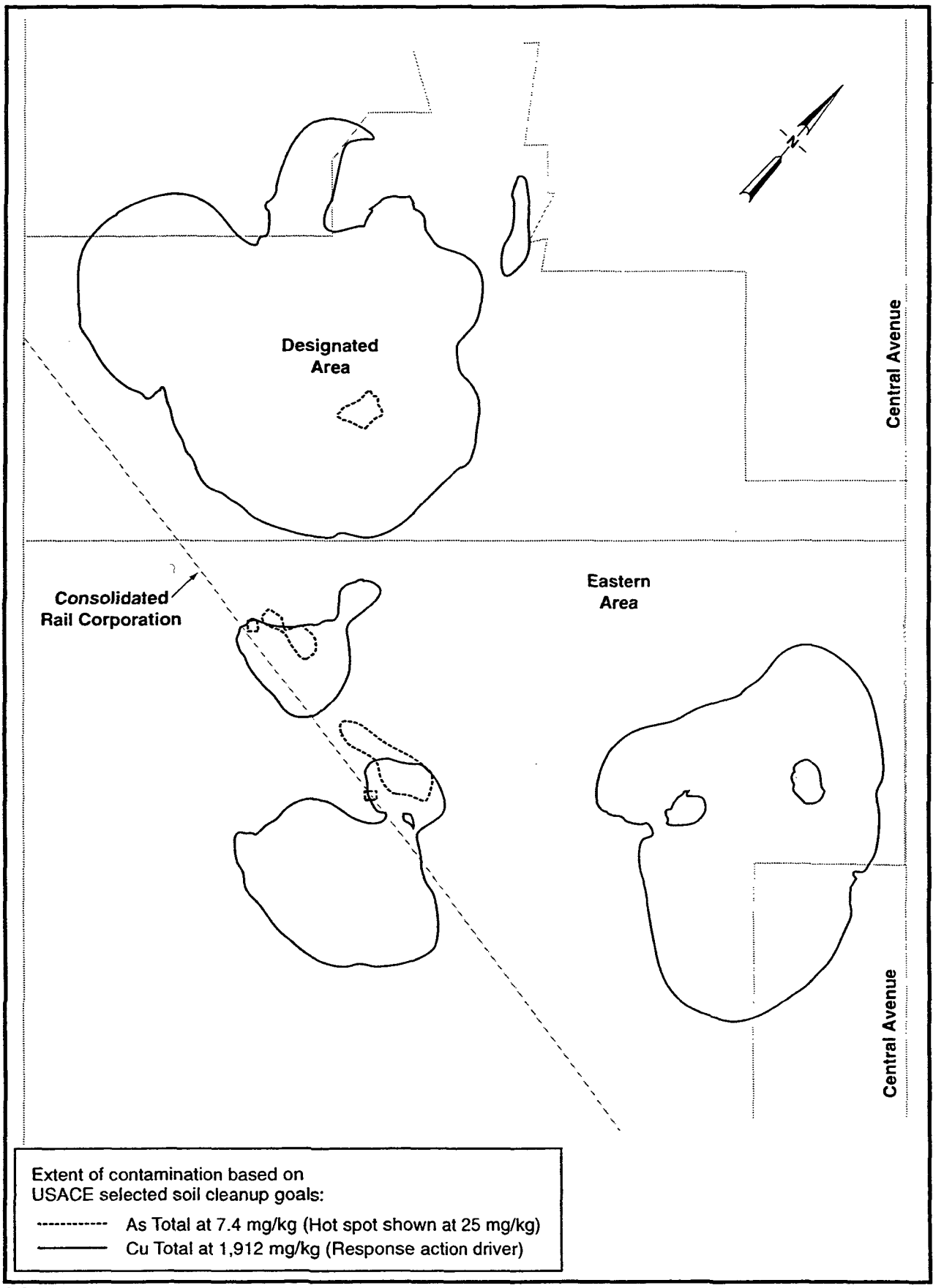
01P-0126-7

FIGURE 7 CO-LOCATION OF PRIMARY CONTAMINANTS AT THE COLONIE SITE: ARSENIC, 0-2 FT



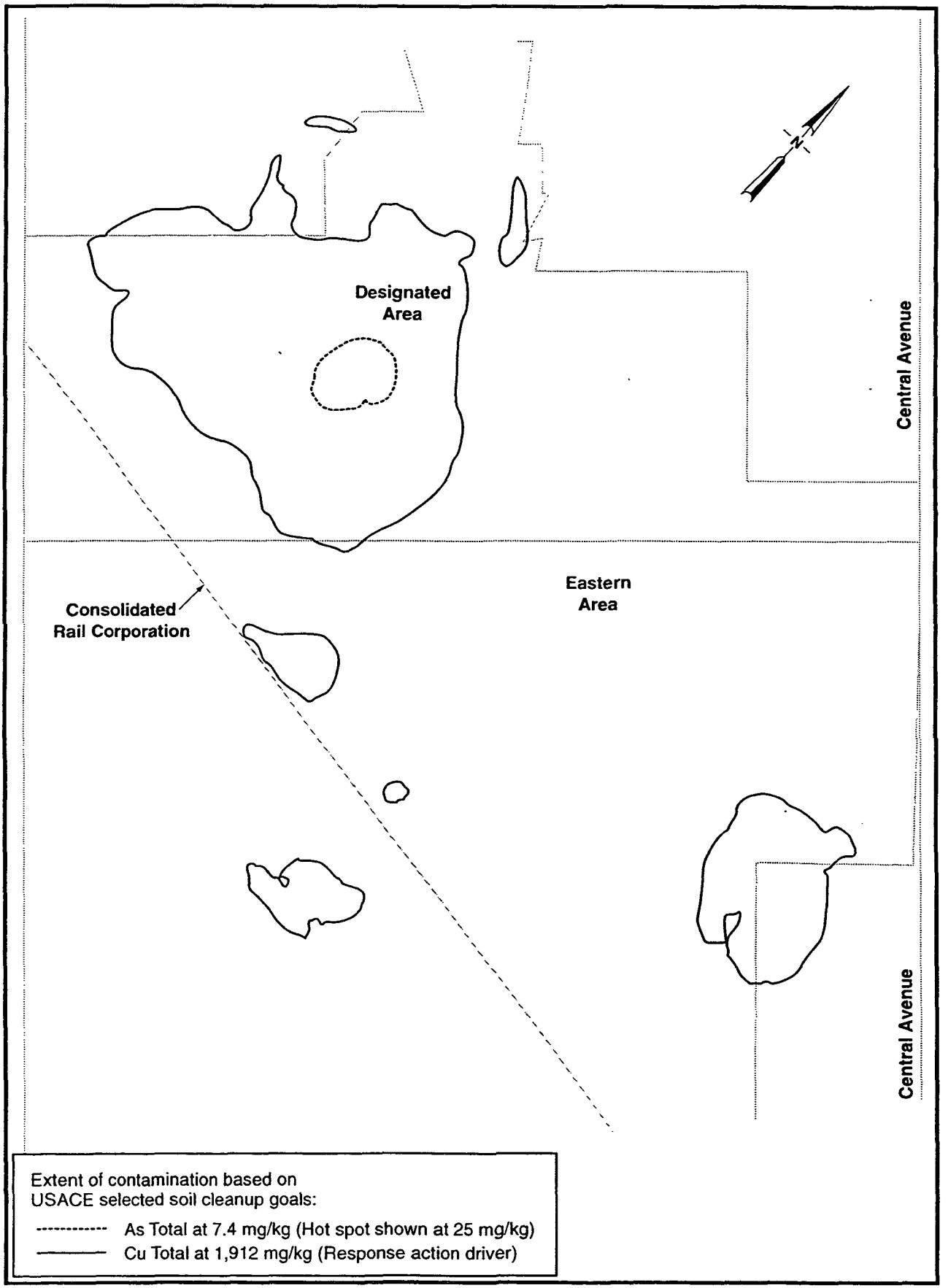
01P-0126-8

FIGURE 8 CO-LOCATION OF PRIMARY CONTAMINANTS AT THE COLONIE SITE: ARSENIC, 2-4 FT



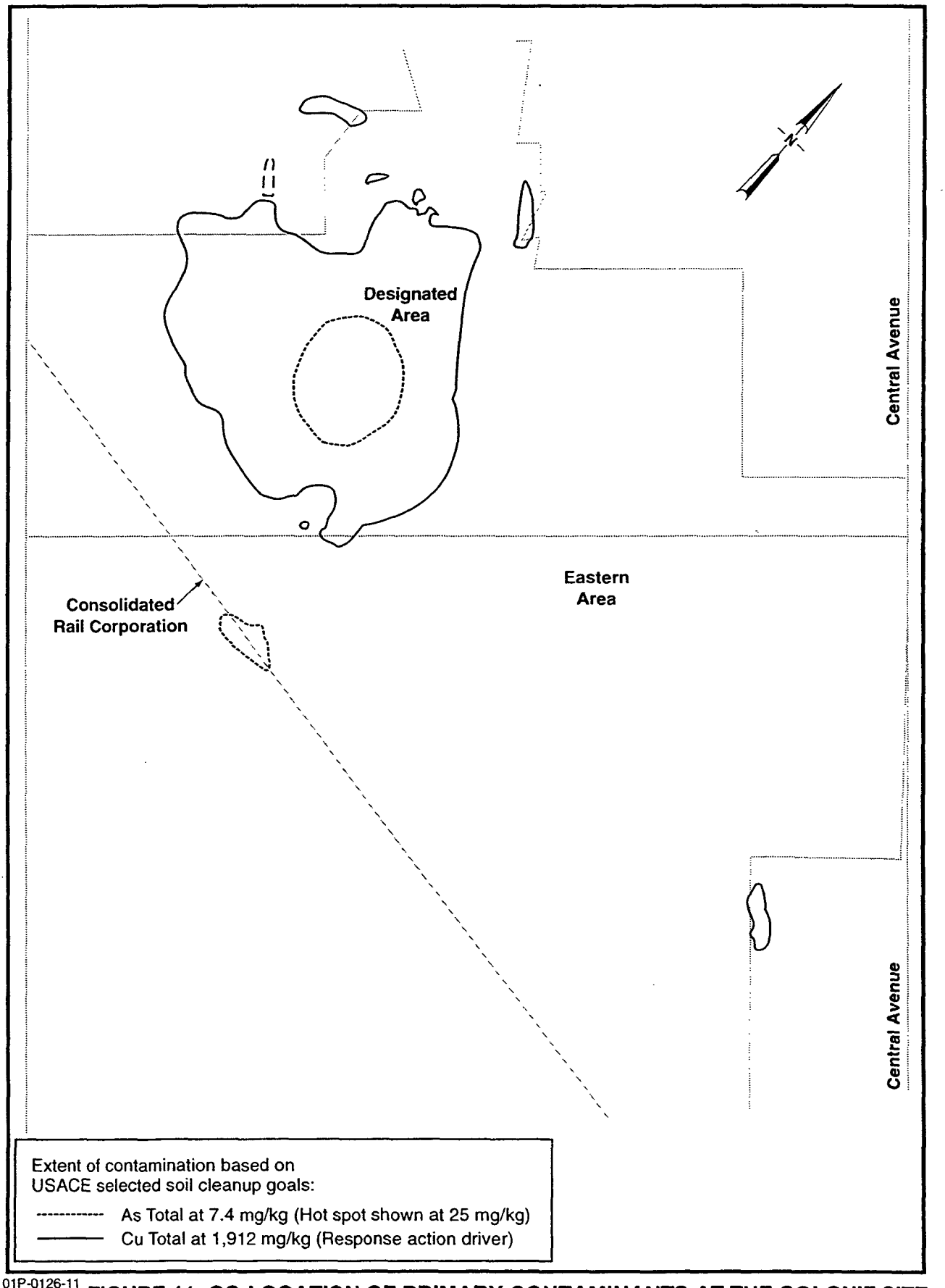
01P-0126-9

FIGURE 9 CO-LOCATION OF PRIMARY CONTAMINANTS AT THE COLONIE SITE: ARSENIC, 4-6 FT



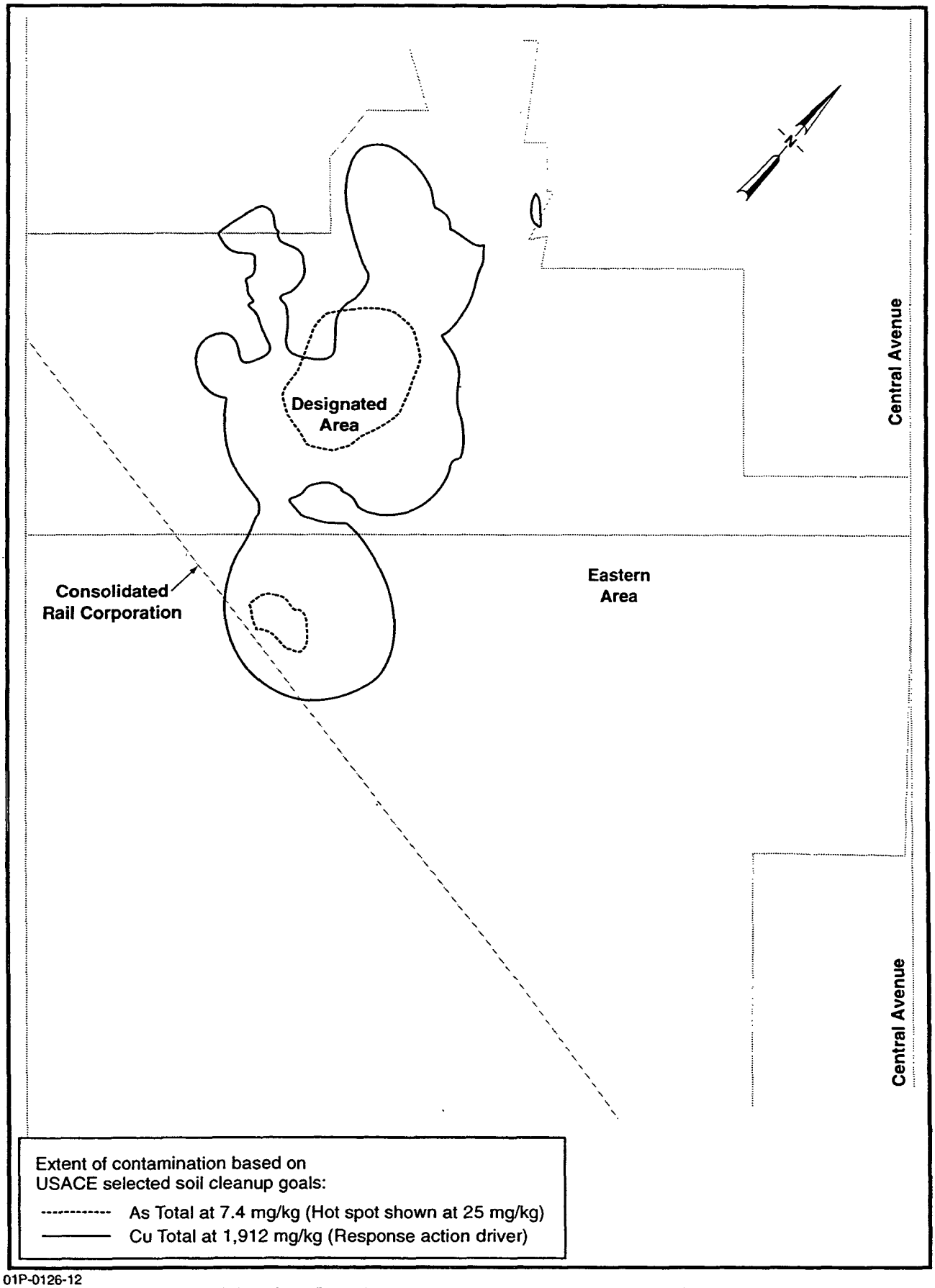
01P-0126-10

FIGURE 10 CO-LOCATION OF PRIMARY CONTAMINANTS AT THE COLONIE SITE: ARSENIC, 6-8 FT



01P-0126-11

FIGURE 11 CO-LOCATION OF PRIMARY CONTAMINANTS AT THE COLONIE SITE: ARSENIC, 8-10 FT



01P-0126-12

FIGURE 12 CO-LOCATION OF PRIMARY CONTAMINANTS AT THE COLONIE SITE: ARSENIC, BELOW 10 FT

APPENDIX D:

RESRAD On-Site Analyses for Uranium and Thorium

CONTENTS OF APPENDIX D

- Table 1, NRC Default RESRAD Paramters
- Table 2, RESRAD Input Parameters for Sensitivity Analysis
- Table 3, Transport Pathways Considered in RESRAD
- Table 4, Usage Fractions Considered in RESRAD
- Table 5, Summary of Uranium Scenario Pathways with 2-Foot Clean Soil Cover
- Table 6, Summary of Thorium Scenario Pathways with 2-Foot Clean Soil Cover
- Table 7, Summary of Uranium and Thorium Cleanup Criteria
- Table 8, Summary of Kd and Groundwater Modeling Information
- Radiological Criteria for License Termination
- Site Specific Uranium Input Parameters for Resident Farmer, Urban Resident, and Industrial Occupant Scenarios
- Site Specific Thorium Input Parameters for Resident Farmer, Urban Resident, and Industrial Occupant Scenarios
- RESRAD Report – Uranium Resident Farmer Scenario, Part 1: Mixture Sums and Single Radionuclide Guidelines.
- RESRAD Report – Thorium Resident Farmer Scenario, Part 1: Mixture Sums and Single Radionuclide Guidelines.
- RESRAD Report – Uranium Urban Resident Scenario, Part 1: Mixture Sums and Single Radionuclide Guidelines.
- RESRAD Report – Thorium Urban Resident Scenario, Part 1: Mixture Sums and Single Radionuclide Guidelines.
- RESRAD Report – Uranium Industrial Occupant Scenario, Part 1: Mixture Sums and Single Radionuclide Guidelines.
- RESRAD Report – Thorium Industrial Occupant Scenario, Part 1: Mixture Sums and Single Radionuclide Guidelines

TABLE 1

NRC DEFAULT RESRAD PARAMETERS

Parameter	Value	Units
Inhalation rate	1.169E+04	m^3/y
Mass loading for inhalation	3.14E-06	g/m^3
Shielding factor for external radiation	0.5512	unitless
Fraction of time spent indoors.	0.6571	unitless
Fraction of time spent outdoors	0.1101	unitless
Fruits, vegetable, and grain consumption	112	kg/y
Leafy vegetable consumption	21.4	kg/y
Milk consumption	233	L/y
Meat and poultry consumption	65.1	kg/y
Fish consumption	20.6	kg/y
Soil ingestion	18.26	g/y
Drinking water intake	478.5	L/y
Contamination fraction of drinking water	1	unitless
Contamination fraction of livestock water	1	unitless
Contamination fraction of irrigation water	1	unitless
Contamination fraction of aquatic food	1	unitless
Contamination fraction of plant food	1	unitless
Contamination fraction of meat	1	unitless
Contamination fraction of milk	1	unitless
Livestock fodder intake for meat	27.1	kg/d
Livestock fodder intake for milk	63.25	kg/d
Livestock water intake for meat	50	L/d
Livestock water intake for milk	60	L/d
Growing season for non-leafy vegetables	0.25	y
Growing season for leafy vegetables	0.123	y
Growing season for fodder	0.15	y
Storage time for fruits, non-leafy vegetables, and grain	14	d
Storage time for leafy vegetables	1	d
Storage time for milk	1	d
Storage time for meat and poultry	20	d
Storage time for livestock fodder	0	d
Fraction of grain in beef cattle feed	0.0743	unitless
Fraction of grain in milk cow feed	0.0308	unitless
Well pumping rate	118	m^3/y
Irrigation rate	0.5	m/y

TABLE 2

RESRAD INPUT PARAMETERS FOR SENSITIVITY ANALYSIS

In addition to the NRC Default parameters listed in Table 1, the following parameters were used to perform the sensitivity analysis.

a) There is no cover (and density of cover and cover depth erosion rates "not used")
b) There is no unsaturated zone, the surface contamination goes all the way down to the aquifer.
c) The contamination thickness is 0.9 meters, which is the default rooting depth in RESRAD.
d) The Kd value for uranium is assumed to be 15 cm^3/g, which is the default value used in DandD.
e) The Kd value for lead is assumed to be 270 cm^3/g, which is a geometric mean for lead in sand.
f) The Kd value for radium is assumed to be 500 cm^3/g, which is the default value used in DandD
g) The Kd value for thorium is assumed to be 3200 cm^3/g, which is the default value used in DandD
h) The contaminated area is assumed to be 2,400 m^2.
i) The length of the contaminated zone parallel to the aquifer flow is 100 m (default).
j) The basic radiation dose limit is 25 mrem/yr
k) Times since placement of material is 0 years (default).
l) Times for calculations are 1 yr, 3 yr, 10 yr, 30 yr, 50 yr, 100 yr, 300 yr, and 1000 yr.
m) Initial principal radionuclide (U-238) 1 pCi/g.
n) Concentration in groundwater is "not used".
o) Density of the contaminated zone is 1.431 g/cm^3 (NRC 1999a).
p) Contaminated zone erosion rate 0.001 m/yr (default).
q) Contamination zone total porosity, 0.4 (default).
r) Contamination zone field capacity 0.2 (default).
s) Contamination zone hydraulic conductivity 10 m/yr (default).
t) Contaminated zone b parameter 5.3 (default).
u) Average wind speed 2.0 m/sec (default).
v) Humidity in air is "not used".
w) Evapotranspiration coefficient 0.5 (default).
x) Precipitation 1.0 m/yr (default)
y) Irrigation mode is "overhead" (default).
z) Runoff coefficient 0.2 (default).

TABLE 2 (continued)

RESRAD INPUT PARAMETERS FOR SENSITIVITY ANALYSIS

aa) Watershed area for nearby stream or pond 1E+6 m^2 (default).
bb) Accuracy for water/soil computations 1E-3 (default).
cc) Density of saturated zone 1.431 g/cm^3 (assumed same as for contaminated zone).
dd) Saturated zone total porosity 0.4 (default).
ee) Saturated zone effective porosity 0.2 (default).
ff) Saturated zone field capacity 0.2 (default).
gg) Saturated zone hydraulic conductivity 100 m/yr (default).
hh) Saturated zone hydraulic gradient 0.02 (default).
ii) Saturated zone b parameter 5.3 (default).
jj) Water table drop rate 1E-3 m/yr (default).
kk) Well pump intake depth 10 m below water table (default).
ll) Model: Nondispersion ND (default).
mm) Exposure duration 30 yr (default).
nn) Shielding factor for inhalation is 0.4 (default).
oo) Shape factor flag, external; gamma is 1.0 (default)
pp) Radii of shape factor array is "not used"
qq) Fractions of annular areas is "not used".
rr) Other seafood consumption 0.9 kg/yr (default).
ss) Contamination fraction of household water is "not used".
tt) Livestock soil intake 0.5 kg/day (default).
uu) Mass loading for foliar deposition 1E-4 g/m^3 (default).
vv) Depth of soil mixing layer 0.15 m (default).
ww) Household water fraction from ground is "not used"
xx) Storage time for fish, crustacea, and mollusks is 7 days (default)
yy) Storage time for surface and well water is 1 day (default).
zz) Radon, C-12 and C-14 related parameters are "not used".
aaa) The number of graphical time points is 32, maximum integration points for dose is 17 and maximum integration points for risk is 513.

TABLE 3

TRANSPORT PATHWAYS CONSIDERED IN RESRAD

Pathway	Description
External Radiation	From radionuclides distributed throughout the contaminated zone
Inhalation	Inhalation of resuspended contaminated dust indoors and outdoors
Plant Ingestion	Humans ingestion radioactive material by: Water Independent Pathways root uptake from crops grown in the contaminated zone foliar uptake from contaminated dust deposited on the foliage Water Dependent Pathways root uptake from contaminated irrigation water foliar uptake from contaminated irrigation water Note: Water refers to water that has been contaminated by radionuclides that have leached from the contaminated zone
Meat Ingestion	Meat and milk animals ingestion radioactive material by Water Independent Pathways ingestion of contaminated soil root uptake from crops grown in the contaminated zone foliar uptake from contaminated dust deposited on the foliage Water Dependent Pathways ingestion of contaminated water root uptake from contaminated irrigation water foliar uptake from contaminated irrigation water
Milk Ingestion	Same as meat ingestion
Aquatic Foods	Ingestion of fish, crustacea, and mollusks from a nearby pond that has been contaminated by radionuclides
Drinking Water	Irrigation and drinking water are assumed to be taken from a well or pond. The well is assumed to be either in the center of or at the down gradient edge of the contaminated zone. The pond water is assumed to be contaminated by water that seeps to the surface after percolating through the contaminated zone.
Soil Ingestion	Direct ingestion of contaminated soil indoors and out doors.

TABLE 4

USAGE FRACTIONS CONSIDERED IN RESRAD

Usage Fraction	Description
Contaminated Fractions	Allows the user to specify the fraction of annual intake or usage that is contaminated for: Intake human consumption of drinking water human consumption of produce human consumption of meat human consumption of milk human consumption of aquatic food animal consumption of drinking water Usage fraction of human produce and animal fodder grown under irrigation
Groundwater Fractional Use	Allows for consideration of both contaminated surface water and groundwater in the same scenario. The fraction of contaminated groundwater use is specified and the balance is assumed to originate from contaminated surface water. drinking water livestock water irrigation water

TABLE 5

SUMMARY OF SCENARIO PATHWAYS WITH 2-FOOT CLEAN SOIL COVER

Pathways	Resident Farmer	U-238 Dose Fraction	Urban Resident	U-238 Dose Fraction	Industrial Occupant	U-238 Dose Fraction	Offsite Res. Farmer	U-238 Dose Fraction
external radiation	yes	0.00694	yes	0.69002	yes	0.94744	yes	(1)
inhalation	yes	0	yes	0.00305	yes	0.00426	yes	(1)
plant ingestion					no			
water independent	yes	0.01076	yes	0.26276	N/A	0	yes	(1)
water dependent	yes	0.11316	no	0	N/A	0	tes	(2)
meat ingestion			no		no			
water independent	yes	0.00035	N/A	0	N/A	0	yes	(1)
water dependent	yes	0.00382	N/A	0	N/A	0	yes	(2)
milk ingestion			no		no			
water independent	yes	0.00278	N/A	0	N/A	0	yes	(1)
water dependent	yes	0.04408	N/A	0	N/A	0	yes	(2)
aquatic foods	no	0	no	0	no	0	no	(2)
drinking water	yes	0.81777	no	0	no	0	yes	(2)
soil ingestion	yes	0.00035	yes	0.04417	yes	0.04830	yes	(1)
Total		1		1		1		
Contaminated Fractions								
human consumption of drinking water	1		N/A		N/A		1	
human consumption of produce	1		0.25		N/A		1	
human consumption of meat	1		N/A		N/A		1	
human consumption of milk	1		N/A		N/A		1	
human consumption of aquatic food	N/A		N/A		N/A		N/A	
animal consumption of drinking water	1		N/A		N/A		1	
Groundwater Fraction								
drinking water	1		N/A		N/A		1	
livestock water	1		N/A		N/A		1	
irrigation water	1		N/A		N/A		1	

(1) Dose was not explicitly calculated but was evaluated by inspection to be much less than on-site dose from any of the preceeding scenarios.

(2) Off-site groundwater transport analysis demonstrated that contaminated groundwater would reach an off-site well within the 1,000 year dose assessment, and protection of off-site water would be the limiting pathway for the Urban Resident and Industrial Occupant Scenarios.

TABLE 6
SUMMARY OF SCENARIO PATHWAYS WITH 2-FOOT CLEAN SOIL COVER

Pathways	Resident Farmer	Th-232 Dose Frac.	Urban Resident	Th-232 Dose Frac.	Industrial Occupant	Th-232 Dose Frac.	Offsite Res. Farmer	Th-232 Dose Frac.
external radiation	yes	0.42490	yes	0.76698	yes	0.99150	yes	(1)
inhalation	yes	0.00029	yes	0.00039	yes	0.00061	yes	(1)
plant ingestion					no			
water independent	yes	0.49863	yes	0.22492	N/A	0	yes	(1)
water dependent	yes	0	no	0	N/A	0	yes	(2)
meat ingestion			no		no			
water independent	yes	0.00977	N/A	0	N/A	0	yes	(1)
water dependent	yes	0	N/A	0	N/A	0	yes	(2)
milk ingestion			no		no			
water independent	yes	0.06210	N/A	0	N/A	0	yes	(1)
water dependent	yes	0	N/A	0	N/A	0	yes	(2)
aquatic foods	no	0	no	0	no	0	no	(2)
drinking water	yes	0	no	0	yes	0	yes	(2)
soil ingestion	yes	0.00431	yes	0.00771	yes	0.00789	yes	(1)
Total		1		1		1		
Contaminated Fractions								
human consumption of drinking water	1		N/A		N/A		1	
human consumption of produce	1		0.25		N/A		1	
human consumption of meat	1		N/A		N/A		1	
human consumption of milk	1		N/A		N/A		1	
human consumption of aquatic food	N/A		N/A		N/A		N/A	
animal consumption of drinking water	1		N/A		N/A		1	
Groundwater Fraction								
drinking water	1		N/A		N/A		1	
livestock water	1		N/A		N/A		1	
irrigation water	1		N/A		N/A		1	

(1) Dose was not explicitly calculated but was evaluated by inspection to be much less than on-site dose from any of the preceeding scenarios.

(2) Off-site groundwater transport analysis demonstrated that contaminated groundwater would not reach an off-site well within the 1,000 year dose assessment.

Table 7

	Radiological Cleanup Criteria			
	Resident Farmer	Urban Resident	Industrial Occupant	Off-Site Farmer
Isotope	2-foot cover pCi/g	2-foot cover pCi/g	2-foot cover pCi/g	2-foot cover pCi/g
U-238	37	1,373 (110)[1]	4,024 (110)[1]	110
U-235	27	225	682	N/A
U-234	35	2,629	19,720	N/A
Th-232	1.5	2.8	7.6	N/A
Th-230	3.5	9.0	36	N/A

1 Protection of groundwater for the Off-Site Farmer is the limiting factor for these scenarios.

Table 8

Summary of Kd and Groundwater Modeling Information

pH data

Table 4-9 in the Characterization Report for the Colonie Site (BNI 1992) reports a pH data for 10 monitoring wells in 1989; 6 from the upper sand and 4 from the lower sand aquifers. It is not clear if these pH measurements were made *in situ* or in the laboratory.

shallow	6.7 to 8.0, average of 7.1
deep	7.2 to 11, average of 8.7
all	6.7 to 11, average of 7.7

Second Half 1998 Groundwater monitoring report
6.18 to 8.99, average of 7.7

First Half 1999 Groundwater monitoring report
6.51 to 11.48, average of 7.8

Second Half 1999 Groundwater monitoring report
No pH data

First Half 2000 Groundwater monitoring report
No pH data

October 1999 Geoprobe Groundwater sampling report
No pH

Thorium

The lookup table I.5 (EPA 1999) presents the following data for Thorium in a pH range of 5 to 8

Minimum	1,700 cm^3/g
Maximum	300,000 cm^3/g

Equation I.1 gives the following regression fit for pH between 4 to 8:

$$\text{Log (Th Kd)} = -0.13 + 0.69(\text{pH})$$

Average = 152,000 cm^3/g

Neither the minimum nor maximum will have a large effect on the thorium DCGL value because it will not reach groundwater; however the larger values of Kd result in lower DCGLs. On this basis, the thorium Kd is selected to be 300,000 cm^3/g

Uranium

The lookup table J.4 (EPA 1999) presents the following data for a pH range of 7 and 8:

Minimum Kd for a pH of 7 is 63 cm^3/g
Minimum Kd for a pH of 8 is 0.4 cm^3/g
Interpolated value for pH of 7.7 is 19.2 cm^3

In addition to the tabular data for all soil types Figure J-4 plots Kd for different soil types. Given that the unconfined aquifer consists largely of sand, it seems more appropriate to look at data is specific for soil type.

Figure J-4 plots the minimum Kd values for quartz at any pH. Lower Kd values result in lower DCGLs. The value for quartz at a pH of 7.7 is approximately 250. The value for quartz at a pH of 5.2 drops to approximately 62 and the value for quartz at a pH of 8.3 drops to approximately 62.

The Characterization Report provides (BNI 1992) Kd values of 204, 124.4, 223.1, 180, 178.9, and 184.1.

Minimum Kd	124.4 cm^3
Maximum Kd	223.1 cm^3
Average Kd	182.4 cm^3

The RESRAD data collection handbook (ANL 1993) provides a geometric mean of 35 cm^3/g for uranium Kd values in sand with a range from 0.03 to 2,200.

Considering the minimum Kd of 62 in quartz from a pH of 5.2 to 8.3, and the limited data for site-specific measurements showing a minimum Kd value of 124.4, it is considered prudent to select a conservative value of Kd. On this basis, Kd is selected at one-half the lowest site-specific value or 62.

Lead

The lookup table (EPA 1999) F.2 presents the following data for a pH range of 6.4 to 8.7:

Minimum	710 cm^3/g
Maximum	23,270 cm^3/g

The lookup table (EPA 1999) F.2 presents the following data for a pH range of 4.0 to 6.3:

Minimum 150 cm^3/g
Maximum 8,650 cm^3/g
The RESRAD data collection handbook (ANL 1993) provides a geometric mean of 270 cm^3/g for lead Kd values in sand with a range from 270 to 22,000.

A review of groundwater data from 1988 provided two situations where both soil and groundwater concentrations were measured in the same location at the same depth. This data shown below was used to estimate a Kd value. This data is very limited and is not considered to provide a reasonable estimate of site conditions.

Calculation of Lead Kd for available data					
Location	Depth Interval	Soil mg/Kg	Water µg/L	Water mg/L	Ratio Soil/Water
G12	0 - 1.5	6750	48400	48.4	139
G12	1.5 – 3	4790	33700	33.7	142
G12	3 - 4.5	4670	18300	18.3	255
W06S	0 - 1.5	2560	12000	12	213

Plotting and calculating a least squares fit results in Kd=153 L/kg

The value of Kd will have a substantial effect on the cleanup value for lead. Lower values of Kd result in lower DCGLs. Considering the limited amount of site data, the Kd geometric mean value of 270 cm^3/g specified in the RESRAD data collection handbook (ANL 1993) is selected for use in the RESRAD model.

All other decay products of uranium and thorium

Considering that the EPA document does not provide any information for these radionculides values were selected from other literature.

Nuclide	Sand Kd[1]	Kd[2]
Ac-227	450	420
Pa-221	550	510
Ra-226	500	500

1 ANL 1993
2. NRC 1992

The NRC values are selected because they are more conservative

References

ANL 1993 Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil, Argonne National Laboratory, ANL/EAIS-8, April 1993

BNI 1992 Characterization Report for the Colonie Site, Colonie, New York, DOR/OR/21949-260, DOE/OR/21949-260, November 1992

EPA 1999 Understanding Variation in Partition Coefficient, K_d, Values, U.S. Environmental Protection Agency, EPA 42-R-99-004B, August 1999

NRC 1992 Residual Radioactive Contamination from Decommissioning, U.S. Nuclear Regulatory Commission, NUREG/CR-5512, Volume 1, October 1992

Radiological Criteria for License Termination

Based on the Applicable or Relevant and Appropriate Requirements, (see section 4.1), the NRC regulations in 10 CFR 20, Subpart E, Radiological Criteria for License Termination establish the most limiting requirements for performing a radiological risk assessment at the Colonie Site.

1.1 Criteria as Provided by 10 CFR 20 Subpart E, Radiological Criteria for License Termination

These regulations establish requirements for two types of site release. 10 CFR 20 Subpart E (NRC 1997), Section 20.1402 establishes requirements for "Radiological Criteria for Unrestricted Release" and Section 20.1403 establishes requirements for "License Termination under Restricted Conditions."

1.2 10 CFR 20.1401(d), General Provisions and Scope

"When Calculating Total Effective Dose Equivalent (TEDE) to the average member of the critical group the licensee shall determine the peak annual TEDE dose expected within the first 1,000 years after decommissioning."

1.3 10 CFR 20.1402, Radiological Criteria for Unrestricted Release

"A site will be considered acceptable for unrestricted use if the residual radioactivity that is distinguishable from background radiation results in a TEDE to an average member of the critical group that does not exceed 25 mrem per year, including that from groundwater sources of drinking water, and that the residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA)."

1.4 10 CFR 20.1403, Criteria for License Termination Under Restricted Release

Key provisions of these requirements are shown below:
"A site will be considered acceptable for license termination under restricted conditions if:

a) The licensee can demonstrate that further reductions in residual radioactivity necessary to comply with the provisions of 20.1402 would result in net public or environmental harm or were not being made because residual levels associated with restricted conditions are ALARA. Determination of the levels which are ALARA must take into account consideration of any detriments, such as traffic accidents, expected to potentially result from decontamination and waste disposal;
b) The licensee has made provisions for legally enforceable institutional controls that provide reasonable assurance that the TEDE from residual radioactivity distinguishable from background to the average member of the critical group will not exceed 25 mrem per year;
c) The licensee has provided sufficient financial assurance to enable an independent third party, including a governmental custodian of a site, to assume and carry out responsibilities for any necessary control or maintenance of the site. Acceptable financial assurance mechanisms are . . .
e) Residual radioactivity at the site has been reduced so that if the institutional

controls were no longer in effect, there is reasonable assurance that the TEDE from residual radioactivity distinguishable from background to the average member of the critical group is as low as reasonably achievable and would not exceed either—

1) 100 mrem per year; or
2) 500 mrem per year provided that the licensee— ..."

1.5 Key Difference Between Restricted and Unrestricted Release

Both releases restrict the TEDE to the average member of the critical group to 25 mrem per year. However, the restricted release meets this criterion by use of institutional controls that limit dose to the member of the critical group in some way. The critical group used for a restricted release may be different from the critical group use for an unrestricted release.

SITE SPECIFIC URANIUM INPUT PARAMETERS

- **Resident Farmer**
- **Urban Resident**
- **Industrial Occupant**

Resident Farmer Site-Specific Uranium Paramter Summary (part 1 of 2)

Menu	Parameter	Current Value	Default	Paramter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.72E+00	6.72E+00	DCF2(1)
B-1	Pa-231	1.28E+00	1.28E+00	DCF2(2)
B-1	Pb-210+D	2.32E-02	2.32E-02	DCF2(3)
B-1	Ra-226+D	8.60E-03	8.60E-03	DCF2(4)
B-1	Th-230	3.26E-01	3.26E-01	DCF2(5)
B-1	U-234	1.32E-01	1.32E-01	DCF2(6)
B-1	U-235+D	1.23E-01	1.23E-01	DCF2(7)
B-1	U-238+D	1.18E-01	1.18E-01	DCF2(8)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.48E-02	1.48E-02	DCF3(1)
D-1	Pa-231	1.06E-02	1.06E-02	DCF3(2)
D-1	Pb-210+D	7.27E-03	7.27E-03	DCF3(3)
D-1	Ra-226+D	1.33E-03	1.33E-03	DCF3(4)
D-1	Th-230	5.48E-04	5.48E-04	DCF3(5)
D-1	U-234	2.83E-04	2.83E-04	DCF3(6)
D-1	U-235+D	2.67E-04	2.67E-04	DCF3(7)
D-1	U-238+D	2.69E-04	2.69E-04	DCF3(8)
D-34	Food transfer factors:			
D-34	Ac-227+D, plant/soil concentration ratio, dimensionless	2.50E-03	2.50E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d	2.00E-05	2.00E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.00E-05	2.00E-05	RTF(1,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.00E-02	1.00E-02	RTF(2,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.00E-03	5.00E-03	RTF(2,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.00E-06	5.00E-06	RTF(2,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.00E-02	1.00E-02	RTF(3,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.00E-04	8.00E-04	RTF(3,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.00E-04	3.00E-04	RTF(3,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.00E-02	4.00E-02	RTF(4,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.00E-03	1.00E-03	RTF(4,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.00E-03	1.00E-03	RTF(4,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.00E-03	1.00E-03	RTF(5,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.00E-04	1.00E-04	RTF(5,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.00E-06	5.00E-06	RTF(5,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.50E-03	2.50E-03	RTF(6,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.40E-04	3.40E-04	RTF(6,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.00E-04	6.00E-04	RTF(6,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.50E-03	2.50E-03	RTF(7,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.40E-04	3.40E-04	RTF(7,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.00E-04	6.00E-04	RTF(7,3)

Resident Farmer Site-Specific Uranium Paramter Summary (part 1 of 2)

Menu	Parameter	Current Value	Default	Paramter Name
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.50E-03	2.50E-03	RTF(8,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.40E-04	3.40E-04	RTF(8,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.00E-04	6.00E-04	RTF(8,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.50E+01	1.50E+01	BIOFAC(1,1)
D-5	Ac-227+D, crustacea and mollusks	1.00E+03	1.00E+03	BIOFAC(1,2)
D-5				
D-5	Pa-231 , fish	1.00E+01	1.00E+01	BIOFAC(2,1)
D-5	Pa-231 , crustacea and mollusks	1.00E+02	1.00E+02	BIOFAC(2,2)
D-5	Pb-210+D , fish	3.00E+02	3.00E+02	BIOFAC(3,1)
D-5	Pb-210+D, crustacea and mollusks	1.00E+02	1.00E+02	BIOFAC(3,2)
D-5				
D-5	Ra-226+D , fish	5.00E+01	5.00E+01	BIOFAC(4,1)
D-5	Ra-226+D , crustacea and mollusks	2.50E+02	2.50E+02	BIOFAC(4,2)
D-5	Th-230 , fish	1.00E+02	1.00E+02	BIOFAC(5,1)
D-5	Th-230 , crustacea and mollusks	5.00E+02	5.00E+02	BIOFAC(5,2)
D-5	U-234 , fish	1.00E+01	1.00E+01	BIOFAC(6,1)
D-5	U-234 , crustacea and mollusks	6.00E+01	6.00E+01	BIOFAC(6,2)
D-5	U-235+D , fish	1.00E+01	1.00E+01	BIOFAC(7,1)
D-5	U-235+D , crustacea and mollusks	6.00E+01	6.00E+01	BIOFAC(7,2)
D-5	U-238+D , fish	1.00E+01	1.00E+01	BIOFAC(8,1)
D-5	U-238+D , crustacea and mollusks	6.00E+01	6.00E+01	BIOFAC(8,2)

Resident Farmer Site-Specific Uranium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.40E+03	1.00E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.00E+00	2.00E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.00E+02	1.00E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.50E+01	3.00E+01	---	BRDL
R011	Time since placement of material (yr)	0.00E+00	0.00E+00	---	TI
R011	Times for calculations (yr)	1.00E+00	1.00E+00	---	T(2)
R011	Times for calculations (yr)	3.00E+00	3.00E+00	---	T(3)
R011	Times for calculations (yr)	1.00E+01	1.00E+01	---	T(4)
R011	Times for calculations (yr)	3.00E+01	3.00E+01	---	T(5)
R011	Times for calculations (yr)	5.00E+01	1.00E+02	---	T(6)
R011	Times for calculations (yr)	1.00E+02	3.00E+02	---	T(7)
R011	Times for calculations (yr)	3.00E+02	1.00E+03	---	T(8)
R011	Times for calculations (yr)	1.00E+03	0.00E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.00E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): U-234	1.00E+00	0.00E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): U-235	1.00E+00	0.00E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): U-238	1.00E+00	0.00E+00		S1(8)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.00E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.00E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.00E+00		W1(8)
R013	Cover depth (m)	6.096E-01	0.00E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.431E+00	1.50E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.00E-03	1.00E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.431E+00	1.50E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.00E-03	1.00E-03	---	VCZ
R013	Contaminated zone total porosity	3.00E-01	4.00E-01	---	TPCZ
R013	Contaminated zone field capacity	2.00E-01	2.00E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.15E+01	1.00E+01	---	HCCZ
R013	Contaminated zone b parameter	3.50E+00	5.30E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.00E+00	2.00E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.00E+00	---	HUMID
R013	Evapotranspiration coefficient	5.00E-01	5.00E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.99E-01	1.00E+00	---	PRECIP
R013	Irrigation (m/yr)	1.83E-01	2.00E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.00E-01	2.00E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.00E+06	1.00E+06	---	WAREA
R013	Accuracy for water/soil computations	1.00E-03	1.00E-03	Romberg failures occurred	EPS

Resident Farmer Site-Specific Uranium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Density of saturated zone (g/cm**3)	1.431E+00	1.50E+00	---	DENSAQ
R014	Saturated zone total porosity	3.00E-01	4.00E-01	---	TPSZ
R014	Saturated zone effective porosity	2.00E-01	2.00E-01	---	EPSZ
R014	Saturated zone field capacity	2.00E-01	2.00E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	3.12E+02	1.00E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.00E-02	2.00E-02	---	HGWT
R014	Saturated zone b parameter	3.50E+00	5.30E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.00E-03	1.00E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.00E+01	1.00E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.18E+02	2.50E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	6.20E+01	5.00E+01	---	DCNUCC(6)
R016	Saturated zone (cm**3/g)	6.20E+01	5.00E+01	---	DCNUCS(6)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	2.536E-03	RLEACH(6)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(6)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	6.20E+01	5.00E+01	---	DCNUCC(7)
R016	Saturated zone (cm**3/g)	6.20E+01	5.00E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	2.536E-03	ALEACH(7)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(7)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	6.20E+01	5.00E+01	---	DCNUCC(8)
R016	Saturated zone (cm**3/g)	6.20E+01	5.00E+01	---	DCNUCS(8)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	2.536E-03	ALEACH(8)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(8)
R016	Distribution coefficients for Ac-227				
R016	Contaminated zone (cm**3/g)	4.20E+02	2.00E+01	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	4.20E+02	2.00E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	3.752E-04	ALEACH(1)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Pa-231				
R016	Contaminated zone (cm**3/g)	5.10E+02	5.00E+01	---	DCNUCC(2)

Resident Farmer Site-Specific Uranium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Saturated zone (cm**3/g)	5.10E+02	5.00E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	3.090E-04	ALEACH(2)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	2.70E+02	1.00E+02	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	2.70E+02	1.00E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	5.835E-04	ALEACH(3)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	5.00E+02	7.00E+01	---	DCNUCC(4)
R016	Saturated zone (cm**3/g)	5.00E+02	7.00E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	3.151E-04	ALEACH(4)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(4)
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	3.00E+05	6.00E+04	---	DCNUCC(5)
R016	Saturated zone (cm**3/g)	3.00E+05	6.00E+04	---	DCNUCS(5)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	5.254E-07	ALEACH(5)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(5)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.40E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.14E-06	1.00E-04	---	MLINH
R017	Exposure duration	3.00E+01	3.00E+01	---	ED
R017	Shielding factor, inhalation	4.00E-01	4.00E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.00E-01	---	SHF1
R017	Fraction of time spent indoors	6.571E-01	5.00E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.101E-01	2.50E-01	---	FOTD
R017	Shape factor flag, external gamma	1.00E+00	1.00E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.00E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.07E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.00E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.00E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.00E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.00E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.00E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.00E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.00E+00	---	RAD_SHAPE(9)

Resident Farmer Site-Specific Uranium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Outer annular radius (m), ring 10:	not used	0.00E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.00E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.00E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.00E+00	---	FRACA(1)
R017	Ring 2	not used	2.73E-01	---	FRACA(2)
R017	Ring 3	not used	0.00E+00	---	FRACA(3)
R017	Ring 4	not used	0.00E+00	---	FRACA(4)
R017	Ring 5	not used	0.00E+00	---	FRACA(5)
R017	Ring 6	not used	0.00E+00	---	FRACA(6)
R017	Ring 7	not used	0.00E+00	---	FRACA(7)
R017	Ring 8	not used	0.00E+00	---	FRACA(8)
R017	Ring 9	not used	0.00E+00	---	FRACA(9)
R017	Ring 10	not used	0.00E+00	---	FRACA(10)
R017	Ring 11	not used	0.00E+00	---	FRACA(11)
R017	Ring 12	not used	0.00E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.12E+02	1.60E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.14E+01	1.40E+01	---	DIET(2)
R018	Milk consumption (L/yr)	2.33E+02	9.20E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.51E+01	6.30E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.40E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.00E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.65E+01	---	SOIL
R018	Drinking water intake (L/yr)	4.785E+02	5.10E+02	---	DWI
R018	Contamination fraction of drinking water	1.00E+00	1.00E+00	---	FDW
R018	Contamination fraction of household water	not used	1.00E+00	---	FHHW
R018	Contamination fraction of livestock water	1.00E+00	1.00E+00	---	FLW
R018	Contamination fraction of irrigation water	1.00E+00	1.00E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.00E-01	---	FR9
R018	Contamination fraction of plant food	1.00E+00	-1	---	FPLANT
R018	Contamination fraction of meat	1.00E+00	-1	---	FMEAT
R018	Contamination fraction of milk	1.00E+00	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	2.71E+01	6.80E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	6.325E+01	5.50E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.00E+01	5.00E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	6.00E+01	1.60E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.00E-01	5.00E-01	---	LSI

Resident Farmer Site-Specific Uranium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R019	Mass loading for foliar deposition (g/m**3)	1.00E-04	1.00E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.50E-01	1.50E-01	---	DM
R019	Depth of roots (m)	9.00E-01	9.00E-01	---	DROOT
R019	Drinking water fraction from ground water	1.00E+00	1.00E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.00E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.00E+00	1.00E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.00E+00	1.00E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.00E-01	7.00E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.50E+00	1.50E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.10E+00	1.10E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	2.50E-01	1.70E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	1.23E-01	2.50E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	1.50E-01	8.00E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.00E-01	1.00E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.00E+00	1.00E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.00E+00	1.00E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.50E-01	2.50E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.50E-01	2.50E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.50E-01	2.50E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.50E-01	2.50E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.50E-01	2.50E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.50E-01	2.50E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.00E+01	2.00E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.00E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.00E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.00E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.80E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.00E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.00E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.00E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.00E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.00E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.40E+01	1.40E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.00E+00	1.00E+00	---	STOR_T(2)
STOR	Milk	1.00E+00	1.00E+00	---	STOR_T(3)
STOR	Meat and poultry	2.00E+01	2.00E+01	---	STOR_T(4)

Resident Farmer Site-Specific Uranium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
STOR	Fish	7.00E+00	7.00E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.00E+00	7.00E+00	---	STOR_T(6)
STOR	Well water	1.00E+00	1.00E+00	---	STOR_T(7)
STOR	Surface water	1.00E+00	1.00E+00	---	STOR_T(8)
STOR	Livestock fodder	0.00E+00	4.50E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.50E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.40E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.00E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.00E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.00E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.00E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.00E-06	---	DIFCV
R021	in foundation material	not used	3.00E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.00E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.00E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.00E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.50E+00	---	HRM
R021	Building interior area factor	not used	0.00E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.00E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.50E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.50E-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

notes: Greyed area represents user input differing from default

Resident Site-Specific Uranium Paramter Summary (part 1 of 2)

Menu	Parameter	Current Value	Default	Paramter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.72E+00	6.72E+00	DCF2(1)
B-1	Pa-231	1.28E+00	1.28E+00	DCF2(2)
B-1	Pb-210+D	2.32E-02	2.32E-02	DCF2(3)
B-1	Ra-226+D	8.60E-03	8.60E-03	DCF2(4)
B-1	Th-230	3.26E-01	3.26E-01	DCF2(5)
B-1	U-234	1.32E-01	1.32E-01	DCF2(6)
B-1	U-235+D	1.23E-01	1.23E-01	DCF2(7)
B-1	U-238+D	1.18E-01	1.18E-01	DCF2(8)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.48E-02	1.48E-02	DCF3(1)
D-1	Pa-231	1.06E-02	1.06E-02	DCF3(2)
D-1	Pb-210+D	7.27E-03	7.27E-03	DCF3(3)
D-1	Ra-226+D	1.33E-03	1.33E-03	DCF3(4)
D-1	Th-230	5.48E-04	5.48E-04	DCF3(5)
D-1	U-234	2.83E-04	2.83E-04	DCF3(6)
D-1	U-235+D	2.67E-04	2.67E-04	DCF3(7)
D-1	U-238+D	2.69E-04	2.69E-04	DCF3(8)
D-34	Food transfer factors:			
D-34	Ac-227+D, plant/soil concentration ratio, dimensionless	2.50E-03	2.50E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d	2.00E-05	2.00E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.00E-05	2.00E-05	RTF(1,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.00E-02	1.00E-02	RTF(2,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.00E-03	5.00E-03	RTF(2,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.00E-06	5.00E-06	RTF(2,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.00E-02	1.00E-02	RTF(3,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.00E-04	8.00E-04	RTF(3,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.00E-04	3.00E-04	RTF(3,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.00E-02	4.00E-02	RTF(4,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.00E-03	1.00E-03	RTF(4,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.00E-03	1.00E-03	RTF(4,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.00E-03	1.00E-03	RTF(5,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.00E-04	1.00E-04	RTF(5,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.00E-06	5.00E-06	RTF(5,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.50E-03	2.50E-03	RTF(6,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.40E-04	3.40E-04	RTF(6,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.00E-04	6.00E-04	RTF(6,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.50E-03	2.50E-03	RTF(7,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.40E-04	3.40E-04	RTF(7,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.00E-04	6.00E-04	RTF(7,3)

Resident Site-Specific Uranium Paramter Summary (part 1 of 2)

Menu	Parameter	Current Value	Default	Paramter Name
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.50E-03	2.50E-03	RTF(8,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.40E-04	3.40E-04	RTF(8,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.00E-04	6.00E-04	RTF(8,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.50E+01	1.50E+01	BIOFAC(1,1)
D-5	Ac-227+D, crustacea and mollusks	1.00E+03	1.00E+03	BIOFAC(1,2)
D-5				
D-5	Pa-231 , fish	1.00E+01	1.00E+01	BIOFAC(2,1)
D-5	Pa-231 , crustacea and mollusks	1.00E+02	1.00E+02	BIOFAC(2,2)
D-5	Pb-210+D , fish	3.00E+02	3.00E+02	BIOFAC(3,1)
D-5	Pb-210+D, crustacea and mollusks	1.00E+02	1.00E+02	BIOFAC(3,2)
D-5				
D-5	Ra-226+D , fish	5.00E+01	5.00E+01	BIOFAC(4,1)
D-5	Ra-226+D , crustacea and mollusks	2.50E+02	2.50E+02	BIOFAC(4,2)
D-5	Th-230 , fish	1.00E+02	1.00E+02	BIOFAC(5,1)
D-5	Th-230 , crustacea and mollusks	5.00E+02	5.00E+02	BIOFAC(5,2)
D-5	U-234 , fish	1.00E+01	1.00E+01	BIOFAC(6,1)
D-5	U-234 , crustacea and mollusks	6.00E+01	6.00E+01	BIOFAC(6,2)
D-5	U-235+D , fish	1.00E+01	1.00E+01	BIOFAC(7,1)
D-5	U-235+D , crustacea and mollusks	6.00E+01	6.00E+01	BIOFAC(7,2)
D-5	U-238+D , fish	1.00E+01	1.00E+01	BIOFAC(8,1)
D-5	U-238+D , crustacea and mollusks	6.00E+01	6.00E+01	BIOFAC(8,2)

Resident Site-Specific Uranium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.40E+03	1.00E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.00E+00	2.00E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.00E+02	1.00E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.50E+01	3.00E+01	---	BRDL
R011	Time since placement of material (yr)	0.00E+00	0.00E+00	---	TI
R011	Times for calculations (yr)	1.00E+00	1.00E+00	---	T(2)
R011	Times for calculations (yr)	3.00E+00	3.00E+00	---	T(3)
R011	Times for calculations (yr)	1.00E+01	1.00E+01	---	T(4)
R011	Times for calculations (yr)	3.00E+01	3.00E+01	---	T(5)
R011	Times for calculations (yr)	5.00E+01	1.00E+02	---	T(6)
R011	Times for calculations (yr)	1.00E+02	3.00E+02	---	T(7)
R011	Times for calculations (yr)	3.00E+02	1.00E+03	---	T(8)
R011	Times for calculations (yr)	1.00E+03	0.00E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.00E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): U-234	1.00E+00	0.00E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): U-235	1.00E+00	0.00E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): U-238	1.00E+00	0.00E+00		S1(8)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.00E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.00E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.00E+00		W1(8)
R013	Cover depth (m)	6.069E-01	0.00E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.431E+00	1.50E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.00E-03	1.00E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.431E+00	1.50E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.00E-03	1.00E-03	---	VCZ
R013	Contaminated zone total porosity	3.00E-01	4.00E-01	---	TPCZ
R013	Contaminated zone field capacity	2.00E-01	2.00E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.15E+01	1.00E+01	---	HCCZ
R013	Contaminated zone b parameter	3.50E+00	5.30E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.00E+00	2.00E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.00E+00	---	HUMID
R013	Evapotranspiration coefficient	5.00E-01	5.00E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.99E-01	1.00E+00	---	PRECIP
R013	Irrigation (m/yr)	1.83E-01	2.00E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.00E-01	2.00E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.00E+06	1.00E+06	---	WAREA
R013	Accuracy for water/soil computations	1.00E-03	1.00E-03	Romberg failures occurred	EPS

Resident Site-Specific Uranium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Density of saturated zone (g/cm**3)	1.431E+00	1.50E+00	---	DENSAQ
R014	Saturated zone total porosity	3.00E-01	4.00E-01	---	TPSZ
R014	Saturated zone effective porosity	2.00E-01	2.00E-01	---	EPSZ
R014	Saturated zone field capacity	2.00E-01	2.00E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	3.12E+02	1.00E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.00E-02	2.00E-02	---	HGWT
R014	Saturated zone b parameter	3.50E+00	5.30E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.00E-03	1.00E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.00E+01	1.00E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.18E+02	2.50E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	6.20E+01	5.00E+01	---	DCNUCC(6)
R016	Saturated zone (cm**3/g)	6.20E+01	5.00E+01	---	DCNUCS(6)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	2.536E-03	RLEACH(6)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(6)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	6.20E+01	5.00E+01	---	DCNUCC(7)
R016	Saturated zone (cm**3/g)	6.20E+01	5.00E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	2.536E-03	ALEACH(7)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(7)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	6.20E+01	5.00E+01	---	DCNUCC(8)
R016	Saturated zone (cm**3/g)	6.20E+01	5.00E+01	---	DCNUCS(8)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	2.536E-03	ALEACH(8)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(8)
R016	Distribution coefficients for Ac-227				
R016	Contaminated zone (cm**3/g)	4.20E+02	2.00E+01	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	4.20E+02	2.00E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	3.752E-04	ALEACH(1)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Pa-231				
R016	Contaminated zone (cm**3/g)	5.10E+02	5.00E+01	---	DCNUCC(2)

Resident Site-Specific Uranium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Saturated zone (cm**3/g)	5.10E+02	5.00E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	3.090E-04	ALEACH(2)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	2.70E+02	1.00E+02	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	2.70E+02	1.00E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	5.835E-04	ALEACH(3)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	5.00E+02	7.00E+01	---	DCNUCC(4)
R016	Saturated zone (cm**3/g)	5.00E+02	7.00E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	3.151E-04	ALEACH(4)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(4)
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	3.00E+05	6.00E+04	---	DCNUCC(5)
R016	Saturated zone (cm**3/g)	3.00E+05	6.00E+04	---	DCNUCS(5)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	5.254E-07	ALEACH(5)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(5)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.40E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.14E-06	1.00E-04	---	MLINH
R017	Exposure duration	3.00E+01	3.00E+01	---	ED
R017	Shielding factor, inhalation	4.00E-01	4.00E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.00E-01	---	SHF1
R017	Fraction of time spent indoors	6.571E-01	5.00E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.101E-01	2.50E-01	---	FOTD
R017	Shape factor flag, external gamma	1.00E+00	1.00E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.00E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.07E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.00E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.00E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.00E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.00E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.00E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.00E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.00E+00	---	RAD_SHAPE(9)

Resident Site-Specific Uranium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Outer annular radius (m), ring 10:	not used	0.00E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.00E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.00E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.00E+00	---	FRACA(1)
R017	Ring 2	not used	2.73E-01	---	FRACA(2)
R017	Ring 3	not used	0.00E+00	---	FRACA(3)
R017	Ring 4	not used	0.00E+00	---	FRACA(4)
R017	Ring 5	not used	0.00E+00	---	FRACA(5)
R017	Ring 6	not used	0.00E+00	---	FRACA(6)
R017	Ring 7	not used	0.00E+00	---	FRACA(7)
R017	Ring 8	not used	0.00E+00	---	FRACA(8)
R017	Ring 9	not used	0.00E+00	---	FRACA(9)
R017	Ring 10	not used	0.00E+00	---	FRACA(10)
R017	Ring 11	not used	0.00E+00	---	FRACA(11)
R017	Ring 12	not used	0.00E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.12E+02	1.60E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.14E+01	1.40E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.20E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.30E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.40E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.00E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.65E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.10E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.00E+00	---	FDW
R018	Contamination fraction of household water	not used	1.00E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.00E+00	---	FLW
R018	Contamination fraction of irrigation water	0.00E+00	1.00E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.00E-01	---	FR9
R018	Contamination fraction of plant food	0.25	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.80E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.50E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.00E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.60E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.00E-01	---	LSI

Resident Site-Specific Uranium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R019	Mass loading for foliar deposition (g/m**3)	1.00E-04	1.00E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.50E-01	1.50E-01	---	DM
R019	Depth of roots (m)	9.00E-01	9.00E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.00E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.00E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.00E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.00E+00	1.00E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.00E-01	7.00E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.50E+00	1.50E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.10E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	2.50E-01	1.70E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	1.23E-01	2.50E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.00E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.00E-01	1.00E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.00E+00	1.00E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.00E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.50E-01	2.50E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.50E-01	2.50E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.50E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.50E-01	2.50E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.50E-01	2.50E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.50E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.00E+01	2.00E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.00E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.00E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.00E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.80E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.00E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.00E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.00E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.00E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.00E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.40E+01	1.40E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.00E+00	1.00E+00	---	STOR_T(2)
STOR	Milk	1.00E+00	1.00E+00	---	STOR_T(3)
STOR	Meat and poultry	2.00E+01	2.00E+01	---	STOR_T(4)

Resident Site-Specific Uranium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
STOR	Fish	7.00E+00	7.00E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.00E+00	7.00E+00	---	STOR_T(6)
STOR	Well water	1.00E+00	1.00E+00	---	STOR_T(7)
STOR	Surface water	1.00E+00	1.00E+00	---	STOR_T(8)
STOR	Livestock fodder	0.00E+00	4.50E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.50E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.40E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.00E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.00E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.00E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.00E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.00E-06	---	DIFCV
R021	in foundation material	not used	3.00E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.00E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.00E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.00E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.50E+00	---	HRM
R021	Building interior area factor	not used	0.00E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.00E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.50E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.50E-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

notes: Greyed area represents user input differing from default

Industrial Site-Specific Uranium Paramter Summary (part 1 of 2)

Menu	Parameter	Current Value	Default	Paramter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.72E+00	6.72E+00	DCF2(1)
B-1	Pa-231	1.28E+00	1.28E+00	DCF2(2)
B-1	Pb-210+D	2.32E-02	2.32E-02	DCF2(3)
B-1	Ra-226+D	8.60E-03	8.60E-03	DCF2(4)
B-1	Th-230	3.26E-01	3.26E-01	DCF2(5)
B-1	U-234	1.32E-01	1.32E-01	DCF2(6)
B-1	U-235+D	1.23E-01	1.23E-01	DCF2(7)
B-1	U-238+D	1.18E-01	1.18E-01	DCF2(8)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.48E-02	1.48E-02	DCF3(1)
D-1	Pa-231	1.06E-02	1.06E-02	DCF3(2)
D-1	Pb-210+D	7.27E-03	7.27E-03	DCF3(3)
D-1	Ra-226+D	1.33E-03	1.33E-03	DCF3(4)
D-1	Th-230	5.48E-04	5.48E-04	DCF3(5)
D-1	U-234	2.83E-04	2.83E-04	DCF3(6)
D-1	U-235+D	2.67E-04	2.67E-04	DCF3(7)
D-1	U-238+D	2.69E-04	2.69E-04	DCF3(8)
D-34	Food transfer factors:			
D-34	Ac-227+D, plant/soil concentration ratio, dimensionless	2.50E-03	2.50E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d	2.00E-05	2.00E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.00E-05	2.00E-05	RTF(1,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.00E-02	1.00E-02	RTF(2,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.00E-03	5.00E-03	RTF(2,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.00E-06	5.00E-06	RTF(2,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.00E-02	1.00E-02	RTF(3,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.00E-04	8.00E-04	RTF(3,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.00E-04	3.00E-04	RTF(3,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.00E-02	4.00E-02	RTF(4,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.00E-03	1.00E-03	RTF(4,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.00E-03	1.00E-03	RTF(4,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.00E-03	1.00E-03	RTF(5,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.00E-04	1.00E-04	RTF(5,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.00E-06	5.00E-06	RTF(5,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.50E-03	2.50E-03	RTF(6,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.40E-04	3.40E-04	RTF(6,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.00E-04	6.00E-04	RTF(6,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.50E-03	2.50E-03	RTF(7,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.40E-04	3.40E-04	RTF(7,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.00E-04	6.00E-04	RTF(7,3)

Industrial Site-Specific Uranium Paramter Summary (part 1 of 2)

Menu	Parameter	Current Value	Default	Paramter Name
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.50E-03	2.50E-03	RTF(8,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.40E-04	3.40E-04	RTF(8,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.00E-04	6.00E-04	RTF(8,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.50E+01	1.50E+01	BIOFAC(1,1)
D-5	Ac-227+D, crustacea and mollusks	1.00E+03	1.00E+03	BIOFAC(1,2)
D-5				
D-5	Pa-231 , fish	1.00E+01	1.00E+01	BIOFAC(2,1)
D-5	Pa-231 , crustacea and mollusks	1.00E+02	1.00E+02	BIOFAC(2,2)
D-5	Pb-210+D , fish	3.00E+02	3.00E+02	BIOFAC(3,1)
D-5	Pb-210+D, crustacea and mollusks	1.00E+02	1.00E+02	BIOFAC(3,2)
D-5				
D-5	Ra-226+D , fish	5.00E+01	5.00E+01	BIOFAC(4,1)
D-5	Ra-226+D , crustacea and mollusks	2.50E+02	2.50E+02	BIOFAC(4,2)
D-5	Th-230 , fish	1.00E+02	1.00E+02	BIOFAC(5,1)
D-5	Th-230 , crustacea and mollusks	5.00E+02	5.00E+02	BIOFAC(5,2)
D-5	U-234 , fish	1.00E+01	1.00E+01	BIOFAC(6,1)
D-5	U-234 , crustacea and mollusks	6.00E+01	6.00E+01	BIOFAC(6,2)
D-5	U-235+D , fish	1.00E+01	1.00E+01	BIOFAC(7,1)
D-5	U-235+D , crustacea and mollusks	6.00E+01	6.00E+01	BIOFAC(7,2)
D-5	U-238+D , fish	1.00E+01	1.00E+01	BIOFAC(8,1)
D-5	U-238+D , crustacea and mollusks	6.00E+01	6.00E+01	BIOFAC(8,2)

Industrial Site-Specific Uranium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.40E+03	1.00E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.00E+00	2.00E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.00E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.50E+01	3.00E+01	---	BRDL
R011	Time since placement of material (yr)	0.00E+00	0.00E+00	---	TI
R011	Times for calculations (yr)	1.00E+00	1.00E+00	---	T(2)
R011	Times for calculations (yr)	3.00E+00	3.00E+00	---	T(3)
R011	Times for calculations (yr)	1.00E+01	1.00E+01	---	T(4)
R011	Times for calculations (yr)	3.00E+01	3.00E+01	---	T(5)
R011	Times for calculations (yr)	5.00E+01	1.00E+02	---	T(6)
R011	Times for calculations (yr)	1.00E+02	3.00E+02	---	T(7)
R011	Times for calculations (yr)	3.00E+02	1.00E+03	---	T(8)
R011	Times for calculations (yr)	1.00E+03	0.00E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.00E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): U-234	1.00E+00	0.00E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): U-235	1.00E+00	0.00E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): U-238	1.00E+00	0.00E+00		S1(8)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.00E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.00E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.00E+00		W1(8)
R013	Cover depth (m)	6.096E-01	0.00E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.431E+00	1.50E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.00E-03	1.00E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.431E+00	1.50E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.00E-03	1.00E-03	---	VCZ
R013	Contaminated zone total porosity	3.00E-01	4.00E-01	---	TPCZ
R013	Contaminated zone field capacity	2.00E-01	2.00E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.15E+01	1.00E+01	---	HCCZ
R013	Contaminated zone b parameter	3.50E+00	5.30E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.00E+00	2.00E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.00E+00	---	HUMID
R013	Evapotranspiration coefficient	5.00E-01	5.00E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.99E-01	1.00E+00	---	PRECIP
R013	Irrigation (m/yr)	1.83E-01	2.00E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.00E-01	2.00E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.00E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.00E-03	Romberg failures occurred	EPS

Industrial Site-Specific Uranium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Density of saturated zone (g/cm**3)	not used	1.50E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.00E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.00E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.00E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.00E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.00E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.30E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.00E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.00E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.50E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	6.20E+01	5.00E+01	---	DCNUCC(6)
R016	Saturated zone (cm**3/g)	not used	5.00E+01	---	DCNUCS(6)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	2.536E-03	RLEACH(6)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(6)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	6.20E+01	5.00E+01	---	DCNUCC(7)
R016	Saturated zone (cm**3/g)	not used	5.00E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	2.536E-03	ALEACH(7)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(7)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	6.20E+01	5.00E+01	---	DCNUCC(8)
R016	Saturated zone (cm**3/g)	not used	5.00E+01	---	DCNUCS(8)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	2.536E-03	ALEACH(8)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(8)
R016	Distribution coefficients for Ac-227				
R016	Contaminated zone (cm**3/g)	4.20E+02	2.00E+01	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	not used	2.00E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	3.752E-04	ALEACH(1)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Pa-231				
R016	Contaminated zone (cm**3/g)	5.10E+02	5.00E+01	---	DCNUCC(2)

Industrial Site-Specific Uranium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Saturated zone (cm**3/g)	not used	5.00E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	3.090E-04	ALEACH(2)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	2.70E+02	1.00E+02	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	not used	1.00E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	5.835E-04	ALEACH(3)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	5.00E+02	7.00E+01	---	DCNUCC(4)
R016	Saturated zone (cm**3/g)	not used	7.00E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	3.151E-04	ALEACH(4)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(4)
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	3.00E+05	6.00E+04	---	DCNUCC(5)
R016	Saturated zone (cm**3/g)	not used	6.00E+04	---	DCNUCS(5)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	5.254E-07	ALEACH(5)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(5)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.40E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.14E-06	1.00E-04	---	MLINH
R017	Exposure duration	3.00E+01	3.00E+01	---	ED
R017	Shielding factor, inhalation	4.00E-01	4.00E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.00E-01	---	SHF1
R017	Fraction of time spent indoors	1.426E-01	5.00E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.426E-01	2.50E-01	---	FOTD
R017	Shape factor flag, external gamma	1.00E+00	1.00E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.00E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.07E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.00E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.00E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.00E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.00E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.00E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.00E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.00E+00	---	RAD_SHAPE(9)

Industrial Site-Specific Uranium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Outer annular radius (m), ring 10:	not used	0.00E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.00E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.00E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.00E+00	---	FRACA(1)
R017	Ring 2	not used	2.73E-01	---	FRACA(2)
R017	Ring 3	not used	0.00E+00	---	FRACA(3)
R017	Ring 4	not used	0.00E+00	---	FRACA(4)
R017	Ring 5	not used	0.00E+00	---	FRACA(5)
R017	Ring 6	not used	0.00E+00	---	FRACA(6)
R017	Ring 7	not used	0.00E+00	---	FRACA(7)
R017	Ring 8	not used	0.00E+00	---	FRACA(8)
R017	Ring 9	not used	0.00E+00	---	FRACA(9)
R017	Ring 10	not used	0.00E+00	---	FRACA(10)
R017	Ring 11	not used	0.00E+00	---	FRACA(11)
R017	Ring 12	not used	0.00E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.60E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.40E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.20E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.30E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.40E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.00E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.65E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.10E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.00E+00	---	FDW
R018	Contamination fraction of household water	not used	1.00E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.00E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.00E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.00E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.80E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.50E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.00E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.60E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.00E-01	---	LSI

Industrial Site-Specific Uranium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R019	Mass loading for foliar deposition (g/m**3)	not used	1.00E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.50E-01	1.50E-01	---	DM
R019	Depth of roots (m)	not used	9.00E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.00E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.00E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.00E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.00E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.00E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.50E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.10E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.70E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.50E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.00E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	not used	1.00E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.00E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.00E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.50E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.50E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.50E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.50E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.50E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.50E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.00E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.00E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.00E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.00E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.80E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.00E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.00E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.00E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.00E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.00E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.40E+01	1.40E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.00E+00	1.00E+00	---	STOR_T(2)
STOR	Milk	1.00E+00	1.00E+00	---	STOR_T(3)
STOR	Meat and poultry	2.00E+01	2.00E+01	---	STOR_T(4)

Industrial Site-Specific Uranium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
STOR	Fish	7.00E+00	7.00E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.00E+00	7.00E+00	---	STOR_T(6)
STOR	Well water	1.00E+00	1.00E+00	---	STOR_T(7)
STOR	Surface water	1.00E+00	1.00E+00	---	STOR_T(8)
STOR	Livestock fodder	0.00E+00	4.50E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.50E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.40E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.00E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.00E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.00E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.00E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.00E-06	---	DIFCV
R021	in foundation material	not used	3.00E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.00E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.00E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.00E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.50E+00	---	HRM
R021	Building interior area factor	not used	0.00E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.00E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.50E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.50E-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

notes: Greyed area represents user input differing from default

SITE SPECIFIC THORIUM INPUT PARAMETERS

- **Resident Farmer**
- **Urban Resident**
- **Industrial Occupant**

Resident Farmer Site-Specific Thorium Paramter Summary (part 1 of 2)

Menu	Parameter	Current Value	Default	Paramter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Pb-210+D	2.32E-02	2.32E-02	DCF2(1)
B-1	Ra-226+D	8.60E-03	8.60E-03	DCF2(2)
B-1	Ra-228+D	5.08E-03	5.08E-03	DCF2(3)
B-1	Th-228+D	3.45E-01	3.45E-01	DCF2(4)
B-1	Th-230	3.26E-01	3.26E-01	DCF2(5)
B-1	Th-232	1.64E+00	1.64E+00	DCF2(6)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Pb-210+D	7.27E-03	7.27E-03	DCF3(1)
D-1	Ra-226+D	1.33E-03	1.33E-03	DCF3(2)
D-1	Ra-228+D	1.44E-03	1.44E-03	DCF3(3)
D-1	Th-228+D	8.08E-04	8.08E-04	DCF3(4)
D-1	Th-230	5.48E-04	5.48E-04	DCF3(5)
D-1	Th-232	2.73E-03	2.73E-03	DCF3(6)
D-34	Food transfer factors:			
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.00E-02	1.00E-02	RTF(1,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.00E-04	8.00E-04	RTF(1,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.00E-04	3.00E-04	RTF(1,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.00E-02	4.00E-02	RTF(2,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.00E-03	1.00E-03	RTF(2,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.00E-03	1.00E-03	RTF(2,3)
D-34				
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.00E-02	4.00E-02	RTF(3,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.00E-03	1.00E-03	RTF(3,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.00E-03	1.00E-03	RTF(3,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.00E-03	1.00E-03	RTF(4,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.00E-04	1.00E-04	RTF(4,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.00E-06	5.00E-06	RTF(4,3)
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.00E-03	1.00E-03	RTF(5,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.00E-04	1.00E-04	RTF(5,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.00E-06	5.00E-06	RTF(5,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.00E-03	1.00E-03	RTF(6,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.00E-04	1.00E-04	RTF(6,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.00E-06	5.00E-06	RTF(6,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Pb-210+D , fish	3.00E+02	3.00E+02	BIOFAC(1,1)
D-5	Pb-210+D, crustacea and mollusks	1.00E+02	1.00E+02	BIOFAC(1,2)
D-5				
D-5	Ra-226+D , fish	5.00E+01	5.00E+01	BIOFAC(2,1)
D-5	Ra-226+D , crustacea and mollusks	2.50E+02	2.50E+02	BIOFAC(2,2)

Resident Farmer Site-Specific Thorium Paramter Summary (part 1 of 2)

Menu	Parameter	Current Value	Default	Paramter Name
D-5	Ra-228+D , fish	5.00E+01	5.00E+01	BIOFAC(3,1)
D-5	Ra-228+D , crustacea and mollusks	2.50E+02	2.50E+02	BIOFAC(3,2)
D-5				
D-5	Th-228+D , fish	1.00E+02	1.00E+02	BIOFAC(4,1)
D-5	Th-228+D , crustacea and mollusks	5.00E+02	5.00E+02	BIOFAC(4,2)
D-5				
D-5	Th-230 , fish	1.00E+02	1.00E+02	BIOFAC(5,1)
D-5	Th-230 , crustacea and mollusks	5.00E+02	5.00E+02	BIOFAC(5,2)
D-5				
D-5	Th-232 , fish	1.00E+02	1.00E+02	BIOFAC(6,1)
D-5	Th-232 , crustacea and mollusks	5.00E+02	5.00E+02	BIOFAC(6,2)

Resident Farmer Site-Specific Thorium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.40E+03	1.00E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.00E+00	2.00E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.00E+02	1.00E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.50E+01	3.00E+01	---	BRDL
R011	Time since placement of material (yr)	0.00E+00	0.00E+00	---	TI
R011	Times for calculations (yr)	1.00E+00	1.00E+00	---	T(2)
R011	Times for calculations (yr)	3.00E+00	3.00E+00	---	T(3)
R011	Times for calculations (yr)	1.00E+01	1.00E+01	---	T(4)
R011	Times for calculations (yr)	3.00E+01	3.00E+01	---	T(5)
R011	Times for calculations (yr)	5.00E+01	1.00E+02	---	T(6)
R011	Times for calculations (yr)	1.00E+02	3.00E+02	---	T(7)
R011	Times for calculations (yr)	3.00E+02	1.00E+03	---	T(8)
R011	Times for calculations (yr)	1.00E+03	0.00E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.00E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Th-230	1.00E+00	0.00E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): Th-232	1.00E+00	0.00E+00	---	S1(6)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.00E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.00E+00	---	W1(6)
R013	Cover depth (m)	6.096E-01	0.00E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.431E+00	1.50E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.00E-03	1.00E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.431E+00	1.50E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.00E-03	1.00E-03	---	VCZ
R013	Contaminated zone total porosity	3.00E-01	4.00E-01	---	TPCZ
R013	Contaminated zone field capacity	2.00E-01	2.00E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.15E+01	1.00E+01	---	HCCZ
R013	Contaminated zone b parameter	3.50E+00	5.30E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.00E+00	2.00E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.00E+00	---	HUMID
R013	Evapotranspiration coefficient	5.00E-01	5.00E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.99E-01	1.00E+00	---	PRECIP
R013	Irrigation (m/yr)	1.83E-01	2.00E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.00E-01	2.00E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.00E+06	1.00E+06	---	WAREA
R013	Accuracy for water/soil computations	1.00E-03	1.00E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.431E+00	1.50E+00	---	DENSAQ
R014	Saturated zone total porosity	3.00E-01	4.00E-01	---	TPSZ

Resident Farmer Site-Specific Thorium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Saturated zone effective porosity	2.00E-01	2.00E-01	---	EPSZ
R014	Saturated zone field capacity	2.00E-01	2.00E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	3.12E+02	1.00E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.00E-02	2.00E-02	---	HGWT
R014	Saturated zone b parameter	3.50E+00	5.30E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.00E-03	1.00E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.00E+01	1.00E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.18E+02	2.50E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	3.00E+05	6.00E+04	---	DCNUCC(5)
R016	Saturated zone (cm**3/g)	3.00E+05	6.00E+04	---	DCNUCS(5)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	5.254E-07	ALEACH(5)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(5)
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	3.00E+05	6.00E+04	---	DCNUCC(6)
R016	Saturated zone (cm**3/g)	3.00E+05	6.00E+04	---	DCNUCS(6)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	3.314E-02	ALEACH(6)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(6)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	2.70E+02	1.00E+02	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	2.70E+02	1.00E+02	---	DCNUCS(1)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	5.835E-04	ALEACH(1)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	5.00E+02	7.00E+01	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	5.00E+02	7.00E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	3.151E-04	ALEACH(2)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	5.00E+02	7.00E+01	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	5.00E+02	7.00E+01	---	DCNUCS(3)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	3.151E-04	ALEACH(3)

Resident Farmer Site-Specific Thorium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Th-228				
R016	Contaminated zone (cm**3/g)	3.00E+05	6.00E+04	---	DCNUCC(4)
R016	Saturated zone (cm**3/g)	3.00E+05	6.00E+04	---	DCNUCS(4)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	5.254E-07	ALEACH(4)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(4)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.40E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.14E-06	1.00E-04	---	MLINH
R017	Exposure duration	3.00E+01	3.00E+01	---	ED
R017	Shielding factor, inhalation	4.00E-01	4.00E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.00E-01	---	SHF1
R017	Fraction of time spent indoors	6.571E-01	5.00E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.101E-01	2.50E-01	---	FOTD
R017	Shape factor flag, external gamma	1.00E+00	1.00E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.00E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.07E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.00E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.00E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.00E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.00E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.00E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.00E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.00E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.00E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.00E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.00E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.00E+00	---	FRACA(1)
R017	Ring 2	not used	2.73E-01	---	FRACA(2)
R017	Ring 3	not used	0.00E+00	---	FRACA(3)
R017	Ring 4	not used	0.00E+00	---	FRACA(4)
R017	Ring 5	not used	0.00E+00	---	FRACA(5)
R017	Ring 6	not used	0.00E+00	---	FRACA(6)
R017	Ring 7	not used	0.00E+00	---	FRACA(7)
R017	Ring 8	not used	0.00E+00	---	FRACA(8)
R017	Ring 9	not used	0.00E+00	---	FRACA(9)

Resident Farmer Site-Specific Thorium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Ring 10	not used	0.00E+00	---	FRACA(10)
R017	Ring 11	not used	0.00E+00	---	FRACA(11)
R017	Ring 12	not used	0.00E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.12E+02	1.60E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.14E+01	1.40E+01	---	DIET(2)
R018	Milk consumption (L/yr)	2.33E+02	9.20E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.51E+01	6.30E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.40E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.00E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.65E+01	---	SOIL
R018	Drinking water intake (L/yr)	4.785E+02	5.10E+02	---	DWI
R018	Contamination fraction of drinking water	1.00E+00	1.00E+00	---	FDW
R018	Contamination fraction of household water	not used	1.00E+00	---	FHHW
R018	Contamination fraction of livestock water	1.00E+00	1.00E+00	---	FLW
R018	Contamination fraction of irrigation water	1.00E+00	1.00E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.00E-01	---	FR9
R018	Contamination fraction of plant food	1.00E+00	-1	---	FPLANT
R018	Contamination fraction of meat	1.00E+00	-1	---	FMEAT
R018	Contamination fraction of milk	1.00E+00	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	2.71E+01	6.80E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	6.325E+01	5.50E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.00E+01	5.00E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	6.00E+01	1.60E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.00E-01	5.00E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.00E-04	1.00E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.50E-01	1.50E-01	---	DM
R019	Depth of roots (m)	9.00E-01	9.00E-01	---	DROOT
R019	Drinking water fraction from ground water	1.00E+00	1.00E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.00E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.00E+00	1.00E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.00E+00	1.00E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.00E-01	7.00E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.50E+00	1.50E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.10E+00	1.10E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	2.50E-01	1.70E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	1.23E-01	2.50E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	1.50E-01	8.00E-02	---	TE(3)

Resident Farmer Site-Specific Thorium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	1.00E-01	1.00E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.00E+00	1.00E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.00E+00	1.00E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.50E-01	2.50E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.50E-01	2.50E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.50E-01	2.50E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.50E-01	2.50E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.50E-01	2.50E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.50E-01	2.50E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.00E+01	2.00E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.00E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.00E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.00E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.80E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.00E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.00E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.00E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.00E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.00E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.40E+01	1.40E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.00E+00	1.00E+00	---	STOR_T(2)
STOR	Milk	1.00E+00	1.00E+00	---	STOR_T(3)
STOR	Meat and poultry	2.00E+01	2.00E+01	---	STOR_T(4)
STOR	Fish	7.00E+00	7.00E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.00E+00	7.00E+00	---	STOR_T(6)
STOR	Well water	1.00E+00	1.00E+00	---	STOR_T(7)
STOR	Surface water	1.00E+00	1.00E+00	---	STOR_T(8)
STOR	Livestock fodder	0.00E+00	4.50E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.50E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.40E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.00E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.00E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.00E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.00E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.00E-06	---	DIFCV

Resident Farmer Site-Specific Thorium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R021	in foundation material	not used	3.00E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.00E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.00E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.00E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.50E+00	---	HRM
R021	Building interior area factor	not used	0.00E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.00E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.50E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.50E-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

notes: Greyed area represents user input differing from default

Resident Site-Specific Thorium Paramter Summary (part 1 of 2)

Menu	Parameter	Current Value	Default	Paramter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Pb-210+D	2.32E-02	2.32E-02	DCF2(1)
B-1	Ra-226+D	8.60E-03	8.60E-03	DCF2(2)
B-1	Ra-228+D	5.08E-03	5.08E-03	DCF2(3)
B-1	Th-228+D	3.45E-01	3.45E-01	DCF2(4)
B-1	Th-230	3.26E-01	3.26E-01	DCF2(5)
B-1	Th-232	1.64E+00	1.64E+00	DCF2(6)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Pb-210+D	7.27E-03	7.27E-03	DCF3(1)
D-1	Ra-226+D	1.33E-03	1.33E-03	DCF3(2)
D-1	Ra-228+D	1.44E-03	1.44E-03	DCF3(3)
D-1	Th-228+D	8.08E-04	8.08E-04	DCF3(4)
D-1	Th-230	5.48E-04	5.48E-04	DCF3(5)
D-1	Th-232	2.73E-03	2.73E-03	DCF3(6)
D-34	Food transfer factors:			
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.00E-02	1.00E-02	RTF(1,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.00E-04	8.00E-04	RTF(1,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.00E-04	3.00E-04	RTF(1,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.00E-02	4.00E-02	RTF(2,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.00E-03	1.00E-03	RTF(2,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.00E-03	1.00E-03	RTF(2,3)
D-34				
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.00E-02	4.00E-02	RTF(3,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.00E-03	1.00E-03	RTF(3,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.00E-03	1.00E-03	RTF(3,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.00E-03	1.00E-03	RTF(4,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.00E-04	1.00E-04	RTF(4,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.00E-06	5.00E-06	RTF(4,3)
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.00E-03	1.00E-03	RTF(5,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.00E-04	1.00E-04	RTF(5,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.00E-06	5.00E-06	RTF(5,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.00E-03	1.00E-03	RTF(6,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.00E-04	1.00E-04	RTF(6,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.00E-06	5.00E-06	RTF(6,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Pb-210+D , fish	3.00E+02	3.00E+02	BIOFAC(1,1)
D-5	Pb-210+D, crustacea and mollusks	1.00E+02	1.00E+02	BIOFAC(1,2)
D-5				
D-5	Ra-226+D , fish	5.00E+01	5.00E+01	BIOFAC(2,1)
D-5	Ra-226+D , crustacea and mollusks	2.50E+02	2.50E+02	BIOFAC(2,2)

Resident Site-Specific Thorium Paramter Summary (part 1 of 2)

Menu	Parameter	Current Value	Default	Paramter Name
D-5	Ra-228+D , fish	5.00E+01	5.00E+01	BIOFAC(3,1)
D-5	Ra-228+D , crustacea and mollusks	2.50E+02	2.50E+02	BIOFAC(3,2)
D-5				
D-5	Th-228+D , fish	1.00E+02	1.00E+02	BIOFAC(4,1)
D-5	Th-228+D , crustacea and mollusks	5.00E+02	5.00E+02	BIOFAC(4,2)
D-5				
D-5	Th-230 , fish	1.00E+02	1.00E+02	BIOFAC(5,1)
D-5	Th-230 , crustacea and mollusks	5.00E+02	5.00E+02	BIOFAC(5,2)
D-5				
D-5	Th-232 , fish	1.00E+02	1.00E+02	BIOFAC(6,1)
D-5	Th-232 , crustacea and mollusks	5.00E+02	5.00E+02	BIOFAC(6,2)

Resident Site-Specific Thorium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.40E+03	1.00E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.00E+00	2.00E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.00E+02	1.00E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.50E+01	3.00E+01	---	BRDL
R011	Time since placement of material (yr)	0.00E+00	0.00E+00	---	TI
R011	Times for calculations (yr)	1.00E+00	1.00E+00	---	T(2)
R011	Times for calculations (yr)	3.00E+00	3.00E+00	---	T(3)
R011	Times for calculations (yr)	1.00E+01	1.00E+01	---	T(4)
R011	Times for calculations (yr)	3.00E+01	3.00E+01	---	T(5)
R011	Times for calculations (yr)	5.00E+01	1.00E+02	---	T(6)
R011	Times for calculations (yr)	1.00E+02	3.00E+02	---	T(7)
R011	Times for calculations (yr)	3.00E+02	1.00E+03	---	T(8)
R011	Times for calculations (yr)	1.00E+03	0.00E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.00E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Th-230	1.00E+00	0.00E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): Th-232	1.00E+00	0.00E+00	---	S1(6)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.00E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.00E+00	---	W1(6)
R013	Cover depth (m)	6.069E-01	0.00E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.431E+00	1.50E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.00E-03	1.00E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.431E+00	1.50E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.00E-03	1.00E-03	---	VCZ
R013	Contaminated zone total porosity	3.00E-01	4.00E-01	---	TPCZ
R013	Contaminated zone field capacity	2.00E-01	2.00E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.15E+01	1.00E+01	---	HCCZ
R013	Contaminated zone b parameter	3.50E+00	5.30E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.00E+00	2.00E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.00E+00	---	HUMID
R013	Evapotranspiration coefficient	5.00E-01	5.00E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.99E-01	1.00E+00	---	PRECIP
R013	Irrigation (m/yr)	1.83E-01	2.00E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.00E-01	2.00E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.00E+06	1.00E+06	---	WAREA
R013	Accuracy for water/soil computations	1.00E-03	1.00E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.431E+00	1.50E+00	---	DENSAQ
R014	Saturated zone total porosity	3.00E-01	4.00E-01	---	TPSZ

Resident Site-Specific Thorium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Saturated zone effective porosity	2.00E-01	2.00E-01	---	EPSZ
R014	Saturated zone field capacity	2.00E-01	2.00E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	3.12E+02	1.00E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.00E-02	2.00E-02	---	HGWT
R014	Saturated zone b parameter	3.50E+00	5.30E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.00E-03	1.00E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.00E+01	1.00E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.18E+02	2.50E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	3.00E+05	6.00E+04	---	DCNUCC(5)
R016	Saturated zone (cm**3/g)	3.00E+05	6.00E+04	---	DCNUCS(5)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	5.254E-07	ALEACH(5)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(5)
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	3.00E+05	6.00E+04	---	DCNUCC(6)
R016	Saturated zone (cm**3/g)	3.00E+05	6.00E+04	---	DCNUCS(6)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	3.314E-02	ALEACH(6)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(6)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	2.70E+02	1.00E+02	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	2.70E+02	1.00E+02	---	DCNUCS(1)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	5.835E-04	ALEACH(1)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	5.00E+02	7.00E+01	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	5.00E+02	7.00E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	3.151E-04	ALEACH(2)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	5.00E+02	7.00E+01	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	5.00E+02	7.00E+01	---	DCNUCS(3)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	3.151E-04	ALEACH(3)

Resident Site-Specific Thorium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Th-228				
R016	Contaminated zone (cm**3/g)	3.00E+05	6.00E+04	---	DCNUCC(4)
R016	Saturated zone (cm**3/g)	3.00E+05	6.00E+04	---	DCNUCS(4)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	5.254E-07	ALEACH(4)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(4)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.40E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.14E-06	1.00E-04	---	MLINH
R017	Exposure duration	3.00E+01	3.00E+01	---	ED
R017	Shielding factor, inhalation	4.00E-01	4.00E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.00E-01	---	SHF1
R017	Fraction of time spent indoors	6.571E-01	5.00E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.101E-01	2.50E-01	---	FOTD
R017	Shape factor flag, external gamma	1.00E+00	1.00E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.00E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.07E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.00E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.00E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.00E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.00E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.00E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.00E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.00E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.00E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.00E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.00E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.00E+00	---	FRACA(1)
R017	Ring 2	not used	2.73E-01	---	FRACA(2)
R017	Ring 3	not used	0.00E+00	---	FRACA(3)
R017	Ring 4	not used	0.00E+00	---	FRACA(4)
R017	Ring 5	not used	0.00E+00	---	FRACA(5)
R017	Ring 6	not used	0.00E+00	---	FRACA(6)
R017	Ring 7	not used	0.00E+00	---	FRACA(7)
R017	Ring 8	not used	0.00E+00	---	FRACA(8)
R017	Ring 9	not used	0.00E+00	---	FRACA(9)

Resident Site-Specific Thorium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Ring 10	not used	0.00E+00	---	FRACA(10)
R017	Ring 11	not used	0.00E+00	---	FRACA(11)
R017	Ring 12	not used	0.00E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.12E+02	1.60E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.14E+01	1.40E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.20E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.30E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.40E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.00E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.65E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.10E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.00E+00	---	FDW
R018	Contamination fraction of household water	not used	1.00E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.00E+00	---	FLW
R018	Contamination fraction of irrigation water	0.00E+00	1.00E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.00E-01	---	FR9
R018	Contamination fraction of plant food	2.50E-01	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.80E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.50E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.00E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.60E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.00E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.00E-04	1.00E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.50E-01	1.50E-01	---	DM
R019	Depth of roots (m)	9.00E-01	9.00E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.00E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.00E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.00E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.00E+00	1.00E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.00E-01	7.00E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.50E+00	1.50E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.10E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	2.50E-01	1.70E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	1.23E-01	2.50E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.00E-02	---	TE(3)

Resident Site-Specific Thorium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	1.00E-01	1.00E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.00E+00	1.00E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.00E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.50E-01	2.50E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.50E-01	2.50E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.50E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.50E-01	2.50E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.50E-01	2.50E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.50E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.00E+01	2.00E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.00E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.00E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.00E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.80E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.00E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.00E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.00E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.00E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.00E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.40E+01	1.40E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.00E+00	1.00E+00	---	STOR_T(2)
STOR	Milk	1.00E+00	1.00E+00	---	STOR_T(3)
STOR	Meat and poultry	2.00E+01	2.00E+01	---	STOR_T(4)
STOR	Fish	7.00E+00	7.00E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.00E+00	7.00E+00	---	STOR_T(6)
STOR	Well water	1.00E+00	1.00E+00	---	STOR_T(7)
STOR	Surface water	1.00E+00	1.00E+00	---	STOR_T(8)
STOR	Livestock fodder	0.00E+00	4.50E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.50E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.40E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.00E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.00E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.00E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.00E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.00E-06	---	DIFCV

Resident Site-Specific Thorium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R021	in foundation material	not used	3.00E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.00E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.00E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.00E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.50E+00	---	HRM
R021	Building interior area factor	not used	0.00E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.00E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.50E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.50E-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

notes: Greyed area represents user input differing from default

Industrial Site-Specific Thorium Paramter Summary (part 1 of 2)

Menu	Parameter	Current Value	Default	Paramter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Pb-210+D	2.32E-02	2.32E-02	DCF2(1)
B-1	Ra-226+D	8.60E-03	8.60E-03	DCF2(2)
B-1	Ra-228+D	5.08E-03	5.08E-03	DCF2(3)
B-1	Th-228+D	3.45E-01	3.45E-01	DCF2(4)
B-1	Th-230	3.26E-01	3.26E-01	DCF2(5)
B-1	Th-232	1.64E+00	1.64E+00	DCF2(6)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Pb-210+D	7.27E-03	7.27E-03	DCF3(1)
D-1	Ra-226+D	1.33E-03	1.33E-03	DCF3(2)
D-1	Ra-228+D	1.44E-03	1.44E-03	DCF3(3)
D-1	Th-228+D	8.08E-04	8.08E-04	DCF3(4)
D-1	Th-230	5.48E-04	5.48E-04	DCF3(5)
D-1	Th-232	2.73E-03	2.73E-03	DCF3(6)
D-34	Food transfer factors:			
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.00E-02	1.00E-02	RTF(1,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.00E-04	8.00E-04	RTF(1,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.00E-04	3.00E-04	RTF(1,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.00E-02	4.00E-02	RTF(2,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.00E-03	1.00E-03	RTF(2,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.00E-03	1.00E-03	RTF(2,3)
D-34				
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.00E-02	4.00E-02	RTF(3,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.00E-03	1.00E-03	RTF(3,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.00E-03	1.00E-03	RTF(3,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.00E-03	1.00E-03	RTF(4,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.00E-04	1.00E-04	RTF(4,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.00E-06	5.00E-06	RTF(4,3)
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.00E-03	1.00E-03	RTF(5,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.00E-04	1.00E-04	RTF(5,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.00E-06	5.00E-06	RTF(5,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.00E-03	1.00E-03	RTF(6,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.00E-04	1.00E-04	RTF(6,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.00E-06	5.00E-06	RTF(6,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Pb-210+D , fish	3.00E+02	3.00E+02	BIOFAC(1,1)
D-5	Pb-210+D, crustacea and mollusks	1.00E+02	1.00E+02	BIOFAC(1,2)
D-5				
D-5	Ra-226+D , fish	5.00E+01	5.00E+01	BIOFAC(2,1)
D-5	Ra-226+D , crustacea and mollusks	2.50E+02	2.50E+02	BIOFAC(2,2)

Industrial Site-Specific Thorium Paramter Summary (part 1 of 2)

Menu	Parameter	Current Value	Default	Paramter Name
D-5	Ra-228+D , fish	5.00E+01	5.00E+01	BIOFAC(3,1)
D-5	Ra-228+D , crustacea and mollusks	2.50E+02	2.50E+02	BIOFAC(3,2)
D-5				
D-5	Th-228+D , fish	1.00E+02	1.00E+02	BIOFAC(4,1)
D-5	Th-228+D , crustacea and mollusks	5.00E+02	5.00E+02	BIOFAC(4,2)
D-5				
D-5	Th-230 , fish	1.00E+02	1.00E+02	BIOFAC(5,1)
D-5	Th-230 , crustacea and mollusks	5.00E+02	5.00E+02	BIOFAC(5,2)
D-5				
D-5	Th-232 , fish	1.00E+02	1.00E+02	BIOFAC(6,1)
D-5	Th-232 , crustacea and mollusks	5.00E+02	5.00E+02	BIOFAC(6,2)

Industrial Site-Specific Thorium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.40E+03	1.00E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.00E+00	2.00E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.00E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.50E+01	3.00E+01	---	BRDL
R011	Time since placement of material (yr)	0.00E+00	0.00E+00	---	TI
R011	Times for calculations (yr)	1.00E+00	1.00E+00	---	T(2)
R011	Times for calculations (yr)	3.00E+00	3.00E+00	---	T(3)
R011	Times for calculations (yr)	1.00E+01	1.00E+01	---	T(4)
R011	Times for calculations (yr)	3.00E+01	3.00E+01	---	T(5)
R011	Times for calculations (yr)	5.00E+01	1.00E+02	---	T(6)
R011	Times for calculations (yr)	1.00E+02	3.00E+02	---	T(7)
R011	Times for calculations (yr)	3.00E+02	1.00E+03	---	T(8)
R011	Times for calculations (yr)	1.00E+03	0.00E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.00E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Th-230	1.00E+00	0.00E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): Th-232	1.00E+00	0.00E+00	---	S1(6)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.00E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.00E+00	---	W1(6)
R013	Cover depth (m)	6.096E-01	0.00E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.431E+00	1.50E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.00E-03	1.00E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.431E+00	1.50E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.00E-03	1.00E-03	---	VCZ
R013	Contaminated zone total porosity	3.00E-01	4.00E-01	---	TPCZ
R013	Contaminated zone field capacity	2.00E-01	2.00E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.15E+01	1.00E+01	---	HCCZ
R013	Contaminated zone b parameter	3.50E+00	5.30E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.00E+00	2.00E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.00E+00	---	HUMID
R013	Evapotranspiration coefficient	5.00E-01	5.00E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.99E-01	1.00E+00	---	PRECIP
R013	Irrigation (m/yr)	1.83E-01	2.00E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.00E-01	2.00E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.00E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.00E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.50E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.00E-01	---	TPSZ

Industrial Site-Specific Thorium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Saturated zone effective porosity	not used	2.00E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.00E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.00E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.00E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.30E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.00E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.00E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.50E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	3.00E+05	6.00E+04	---	DCNUCC(5)
R016	Saturated zone (cm**3/g)	not used	6.00E+04	---	DCNUCS(5)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	5.254E-07	ALEACH(5)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(5)
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	3.00E+05	6.00E+04	---	DCNUCC(6)
R016	Saturated zone (cm**3/g)	not used	6.00E+04	---	DCNUCS(6)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	3.314E-02	ALEACH(6)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(6)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	2.70E+02	1.00E+02	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	not used	1.00E+02	---	DCNUCS(1)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	5.835E-04	ALEACH(1)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	5.00E+02	7.00E+01	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	not used	7.00E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	3.151E-04	ALEACH(2)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	5.00E+02	7.00E+01	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	not used	7.00E+01	---	DCNUCS(3)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	3.151E-04	ALEACH(3)

Industrial Site-Specific Thorium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Th-228				
R016	Contaminated zone (cm**3/g)	3.00E+05	6.00E+04	---	DCNUCC(4)
R016	Saturated zone (cm**3/g)	not used	6.00E+04	---	DCNUCS(4)
R016	Leach rate (/yr)	0.00E+00	0.00E+00	5.254E-07	ALEACH(4)
R016	Solubility constant	0.00E+00	0.00E+00	not used	SOLUBK(4)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.40E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.14E-06	1.00E-04	---	MLINH
R017	Exposure duration	3.00E+01	3.00E+01	---	ED
R017	Shielding factor, inhalation	4.00E-01	4.00E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.00E-01	---	SHF1
R017	Fraction of time spent indoors	1.426E-01	5.00E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.426E-01	2.50E-01	---	FOTD
R017	Shape factor flag, external gamma	1.00E+00	1.00E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.00E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.07E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.00E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.00E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.00E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.00E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.00E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.00E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.00E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.00E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.00E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.00E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.00E+00	---	FRACA(1)
R017	Ring 2	not used	2.73E-01	---	FRACA(2)
R017	Ring 3	not used	0.00E+00	---	FRACA(3)
R017	Ring 4	not used	0.00E+00	---	FRACA(4)
R017	Ring 5	not used	0.00E+00	---	FRACA(5)
R017	Ring 6	not used	0.00E+00	---	FRACA(6)
R017	Ring 7	not used	0.00E+00	---	FRACA(7)
R017	Ring 8	not used	0.00E+00	---	FRACA(8)
R017	Ring 9	not used	0.00E+00	---	FRACA(9)

Industrial Site-Specific Thorium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Ring 10	not used	0.00E+00	---	FRACA(10)
R017	Ring 11	not used	0.00E+00	---	FRACA(11)
R017	Ring 12	not used	0.00E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.60E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.40E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.20E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.30E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.40E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.00E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.65E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.10E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.00E+00	---	FDW
R018	Contamination fraction of household water	not used	1.00E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.00E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.00E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.00E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.80E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.50E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.00E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.60E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.00E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.00E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.50E-01	1.50E-01	---	DM
R019	Depth of roots (m)	not used	9.00E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.00E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.00E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.00E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.00E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.00E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.50E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.10E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.70E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.50E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.00E-02	---	TE(3)

Industrial Site-Specific Thorium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	not used	1.00E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.00E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.00E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.50E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.50E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.50E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.50E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.50E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.50E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.00E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.00E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.00E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.00E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.80E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.00E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.00E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.00E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.00E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.00E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.40E+01	1.40E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.00E+00	1.00E+00	---	STOR_T(2)
STOR	Milk	1.00E+00	1.00E+00	---	STOR_T(3)
STOR	Meat and poultry	2.00E+01	2.00E+01	---	STOR_T(4)
STOR	Fish	7.00E+00	7.00E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.00E+00	7.00E+00	---	STOR_T(6)
STOR	Well water	1.00E+00	1.00E+00	---	STOR_T(7)
STOR	Surface water	1.00E+00	1.00E+00	---	STOR_T(8)
STOR	Livestock fodder	0.00E+00	4.50E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.50E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.40E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.00E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.00E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.00E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.00E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.00E-06	---	DIFCV

Industrial Site-Specific Thorium Parameter Summary (part 2 of 2)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R021	in foundation material	not used	3.00E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.00E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.00E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.00E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.50E+00	---	HRM
R021	Building interior area factor	not used	0.00E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.00E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.50E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.50E-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

notes: Greyed area represents user input differing from default

RESRAD REPORT – URANIUM RESIDENT FARMER SCENARIO

Part 1: Mixture Sums and Single Radionuclide Guidelines

Summary : Resident Farmer Colonie Site Specific for Uranium with Cover

File : RESFARUC.RAD

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Dose Conversion Factor (and Related) Parameter Summary
File: Default.LIB

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

Dose Conversion Factor (and Related) Parameter Summary (Continued)

File: Default.LIB

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

Summary : Resident Farmer Colonie Site Specific for Uranium with Cover

File : RESFARUC.RAD

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.400E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.000E+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)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	5.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): U-234	1.000E+00	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): U-235	1.000E+00	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): U-238	1.000E+00	0.000E+00	---	S1(8)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(8)
R013	Cover depth (m)	6.096E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.431E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.150E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	3.500E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.990E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.830E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	Romberg failures occurred	EPS
R014	Density of saturated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	3.120E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	3.500E+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)	1.000E+01	1.000E+01	---	DWIBWT

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	6.200E+01	5.000E+01	---	DCNUCC(6)
R016	Saturated zone (cm**3/g)	6.200E+01	5.000E+01	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.536E-03	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	6.200E+01	5.000E+01	---	DCNUCC(7)
R016	Saturated zone (cm**3/g)	6.200E+01	5.000E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.536E-03	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	6.200E+01	5.000E+01	---	DCNUCC(8)
R016	Saturated zone (cm**3/g)	6.200E+01	5.000E+01	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.536E-03	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	4.200E+02	2.000E+01	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	4.200E+02	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.752E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Pa-231				
R016	Contaminated zone (cm**3/g)	5.100E+02	5.000E+01	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	5.100E+02	5.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.090E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.835E-04	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(4)
R016	Saturated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.151E-04	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	3.000E+05	6.000E+04	---	DCNUCC(5)
R016	Saturated zone (cm**3/g)	3.000E+05	6.000E+04	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.254E-07	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.571E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.101E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.120E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.140E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	2.330E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.510E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	4.785E+02	5.100E+02	---	DWI

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	1.000E+00	-1	---	FPLANT
R018	Contamination fraction of meat	1.000E+00	-1	---	FMEAT
R018	Contamination fraction of milk	1.000E+00	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	2.710E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	6.325E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	6.000E+01	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	2.500E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	1.230E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	1.500E-01	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	0.000E+00	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	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	active
5 -- milk ingestion	active
6 -- aquatic foods	suppressed
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

Summary : Resident Farmer Colonie Site Specific for Uranium with Cover

File : RESFARUC.RAD

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	2400.00 square meters	U-234	1.000E+00
Thickness:	2.00 meters	U-235	1.000E+00
Cover Depth:	0.61 meters	U-238	1.000E+00

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 25 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	9.694E-02	1.021E-01	1.124E-01	1.481E-01	2.474E-01	3.427E-01	5.645E-01	1.256E+00	2.335E+00
M(t):	3.878E-03	4.084E-03	4.496E-03	5.925E-03	9.896E-03	1.371E-02	2.258E-02	5.024E-02	9.340E-02

Maximum TDOSE(t): 2.335E+00 mrem/yr at t = 1.000E+03 years

Summary : Resident Farmer Colonie Site Specific for Uranium with Cover

File : RESFARUC.RAD

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

As mrem/yr and Fraction of Total Dose At t = 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.
U-234	8.518E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.047E-02	0.3143	1.370E-04	0.0014	2.019E-03	0.0208	0.000E+00	0.0000
U-235	1.981E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.879E-02	0.2970	1.321E-04	0.0014	1.905E-03	0.0197	0.000E+00	0.0000
U-238	1.843E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	2.896E-02	0.2987	1.302E-04	0.0013	1.920E-03	0.0198	0.000E+00	0.0000
Total	2.041E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	8.822E-02	0.9100	3.993E-04	0.0041	5.844E-03	0.0603	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	7.144E-04	0.0074	0.000E+00	0.0000	0.000E+00	0.0000	9.391E-05	0.0010	2.999E-06	0.0000	3.837E-05	0.0004	3.347E-02	0.3453
U-235	6.740E-04	0.0070	0.000E+00	0.0000	0.000E+00	0.0000	8.860E-05	0.0009	2.831E-06	0.0000	3.620E-05	0.0004	3.163E-02	0.3263
U-238	6.791E-04	0.0070	0.000E+00	0.0000	0.000E+00	0.0000	8.926E-05	0.0009	2.851E-06	0.0000	3.648E-05	0.0004	3.184E-02	0.3284
Total	2.068E-03	0.0213	0.000E+00	0.0000	0.000E+00	0.0000	2.718E-04	0.0028	8.681E-06	0.0001	1.111E-04	0.0011	9.694E-02	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.
U-234	2.265E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.049E-02	0.2987	1.371E-04	0.0013	2.021E-03	0.0198	0.000E+00	0.0000
U-235	2.016E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.891E-02	0.2832	1.386E-04	0.0014	1.907E-03	0.0187	0.000E+00	0.0000
U-238	1.863E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	2.899E-02	0.2839	1.303E-04	0.0013	1.921E-03	0.0188	0.000E+00	0.0000
Total	2.065E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	8.839E-02	0.8657	4.061E-04	0.0040	5.850E-03	0.0573	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	2.150E-03	0.0211	0.000E+00	0.0000	0.000E+00	0.0000	2.925E-04	0.0029	9.865E-06	0.0001	1.160E-04	0.0011	3.522E-02	0.3450
U-235	2.028E-03	0.0199	0.000E+00	0.0000	0.000E+00	0.0000	2.760E-04	0.0027	9.319E-06	0.0001	1.094E-04	0.0011	3.338E-02	0.3270
U-238	2.044E-03	0.0200	0.000E+00	0.0000	0.000E+00	0.0000	2.781E-04	0.0027	9.377E-06	0.0001	1.102E-04	0.0011	3.350E-02	0.3281
Total	6.222E-03	0.0609	0.000E+00	0.0000	0.000E+00	0.0000	8.467E-04	0.0083	2.856E-05	0.0003	3.356E-04	0.0033	1.021E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	9.455E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.055E-02	0.2718	1.374E-04	0.0012	2.025E-03	0.0180	0.000E+00	0.0000
U-235	2.087E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.916E-02	0.2595	1.518E-04	0.0014	1.911E-03	0.0170	0.000E+00	0.0000
U-238	1.903E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	2.904E-02	0.2583	1.306E-04	0.0012	1.925E-03	0.0171	0.000E+00	0.0000
Total	2.112E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	8.875E-02	0.7896	4.197E-04	0.0037	5.860E-03	0.0521	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	5.011E-03	0.0446	0.000E+00	0.0000	0.000E+00	0.0000	6.888E-04	0.0061	2.357E-05	0.0002	2.706E-04	0.0024	3.870E-02	0.3443
U-235	4.729E-03	0.0421	0.000E+00	0.0000	0.000E+00	0.0000	6.500E-04	0.0058	2.230E-05	0.0002	2.553E-04	0.0023	3.689E-02	0.3282
U-238	4.764E-03	0.0424	0.000E+00	0.0000	0.000E+00	0.0000	6.547E-04	0.0058	2.241E-05	0.0002	2.572E-04	0.0023	3.681E-02	0.3275
Total	1.450E-02	0.1290	0.000E+00	0.0000	0.000E+00	0.0000	1.993E-03	0.0177	6.829E-05	0.0006	7.832E-04	0.0070	1.124E-01	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Farmer Colonie Site Specific for Uranium with Cover

File : RESFARUC.RAD

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	8.552E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.073E-02	0.2075	1.382E-04	0.0009	2.037E-03	0.0138	0.000E+00	0.0000
U-235	2.355E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.008E-02	0.2031	1.986E-04	0.0013	1.922E-03	0.0130	0.000E+00	0.0000
U-238	2.050E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	2.921E-02	0.1972	1.313E-04	0.0009	1.936E-03	0.0131	0.000E+00	0.0000
Total	2.285E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	9.001E-02	0.6077	4.681E-04	0.0032	5.895E-03	0.0398	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	1.493E-02	0.1008	0.000E+00	0.0000	0.000E+00	0.0000	2.062E-03	0.0139	7.108E-05	0.0005	8.066E-04	0.0054	5.077E-02	0.3428
U-235	1.409E-02	0.0952	0.000E+00	0.0000	0.000E+00	0.0000	1.947E-03	0.0131	6.760E-05	0.0005	7.610E-04	0.0051	4.907E-02	0.3313
U-238	1.419E-02	0.0958	0.000E+00	0.0000	0.000E+00	0.0000	1.960E-03	0.0132	6.757E-05	0.0005	7.668E-04	0.0052	4.828E-02	0.3260
Total	4.321E-02	0.2918	0.000E+00	0.0000	0.000E+00	0.0000	5.968E-03	0.0403	2.063E-04	0.0014	2.334E-03	0.0158	1.481E-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.
U-234	8.876E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.116E-02	0.1259	1.401E-04	0.0006	2.065E-03	0.0083	0.000E+00	0.0000
U-235	3.336E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.290E-02	0.1330	3.383E-04	0.0014	1.950E-03	0.0079	0.000E+00	0.0000
U-238	2.534E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	2.961E-02	0.1197	1.331E-04	0.0005	1.963E-03	0.0079	0.000E+00	0.0000
Total	2.869E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	9.366E-02	0.3786	6.116E-04	0.0025	5.978E-03	0.0242	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	4.243E-02	0.1715	0.000E+00	0.0000	0.000E+00	0.0000	5.870E-03	0.0237	2.028E-04	0.0008	2.293E-03	0.0093	8.416E-02	0.3402
U-235	4.013E-02	0.1622	0.000E+00	0.0000	0.000E+00	0.0000	5.551E-03	0.0224	1.958E-04	0.0008	2.164E-03	0.0087	8.322E-02	0.3364
U-238	4.034E-02	0.1630	0.000E+00	0.0000	0.000E+00	0.0000	5.580E-03	0.0226	1.928E-04	0.0008	2.180E-03	0.0088	8.002E-02	0.3234
Total	1.229E-01	0.4967	0.000E+00	0.0000	0.000E+00	0.0000	1.700E-02	0.0687	5.915E-04	0.0024	6.637E-03	0.0268	2.474E-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+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.
U-234	3.017E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.148E-02	0.0918	1.416E-04	0.0004	2.086E-03	0.0061	0.000E+00	0.0000
U-235	4.730E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.595E-02	0.1049	4.863E-04	0.0014	1.972E-03	0.0058	0.000E+00	0.0000
U-238	3.134E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	2.990E-02	0.0872	1.344E-04	0.0004	1.982E-03	0.0058	0.000E+00	0.0000
Total	3.610E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	9.733E-02	0.2840	7.624E-04	0.0022	6.040E-03	0.0176	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
U-234	6.875E-02	0.2006	0.000E+00	0.0000	0.000E+00	0.0000	9.513E-03	0.0278	3.289E-04	0.0010	3.715E-03	0.0108	1.160E-01	0.3385
U-235	6.515E-02	0.1901	0.000E+00	0.0000	0.000E+00	0.0000	9.015E-03	0.0263	3.223E-04	0.0009	3.506E-03	0.0102	1.164E-01	0.3397
U-238	6.536E-02	0.1907	0.000E+00	0.0000	0.000E+00	0.0000	9.045E-03	0.0264	3.127E-04	0.0009	3.533E-03	0.0103	1.103E-01	0.3218
Total	1.993E-01	0.5814	0.000E+00	0.0000	0.000E+00	0.0000	2.757E-02	0.0805	9.640E-04	0.0028	1.075E-02	0.0314	3.427E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	2.049E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.188E-02	0.0565	1.440E-04	0.0003	2.113E-03	0.0037	0.000E+00	0.0000
U-235	1.134E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.414E-02	0.0782	8.861E-04	0.0016	1.999E-03	0.0035	0.000E+00	0.0000
U-238	5.328E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	3.021E-02	0.0535	1.358E-04	0.0002	2.002E-03	0.0035	0.000E+00	0.0000
Total	6.482E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	1.062E-01	0.1882	1.166E-03	0.0021	6.114E-03	0.0108	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	1.297E-01	0.2297	0.000E+00	0.0000	0.000E+00	0.0000	1.795E-02	0.0318	6.208E-04	0.0011	7.008E-03	0.0124	1.894E-01	0.3355
U-235	1.236E-01	0.2190	0.000E+00	0.0000	0.000E+00	0.0000	1.711E-02	0.0303	6.316E-04	0.0011	6.615E-03	0.0117	1.950E-01	0.3455
U-238	1.233E-01	0.2185	0.000E+00	0.0000	0.000E+00	0.0000	1.707E-02	0.0302	5.904E-04	0.0010	6.665E-03	0.0118	1.800E-01	0.3190
Total	3.766E-01	0.6672	0.000E+00	0.0000	0.000E+00	0.0000	5.213E-02	0.0924	1.843E-03	0.0033	2.029E-02	0.0359	5.645E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	1.600E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.025E-02	0.0241	1.450E-04	0.0001	2.003E-03	0.0016	0.000E+00	0.0000
U-235	3.675E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	7.894E-02	0.0628	2.716E-03	0.0022	1.858E-03	0.0015	0.000E+00	0.0000
U-238	4.452E-04	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	2.751E-02	0.0219	1.237E-04	0.0001	1.823E-03	0.0015	0.000E+00	0.0000
Total	8.287E-04	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	1.367E-01	0.1088	2.985E-03	0.0024	5.684E-03	0.0045	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	3.160E-01	0.2516	0.000E+00	0.0000	0.000E+00	0.0000	4.375E-02	0.0348	1.514E-03	0.0012	1.708E-02	0.0136	4.108E-01	0.3270
U-235	3.104E-01	0.2471	0.000E+00	0.0000	0.000E+00	0.0000	4.298E-02	0.0342	1.786E-03	0.0014	1.614E-02	0.0128	4.552E-01	0.3624
U-238	3.008E-01	0.2395	0.000E+00	0.0000	0.000E+00	0.0000	4.165E-02	0.0332	1.441E-03	0.0011	1.626E-02	0.0129	3.901E-01	0.3106
Total	9.273E-01	0.7382	0.000E+00	0.0000	0.000E+00	0.0000	1.284E-01	0.1022	4.741E-03	0.0038	4.948E-02	0.0394	1.256E+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+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	3.587E-03	0.0015	2.297E-05	0.0000	0.000E+00	0.0000	1.975E-02	0.0085	5.931E-04	0.0003	3.153E-03	0.0014	4.225E-04	0.0002
U-235	3.197E-02	0.0137	1.167E-04	0.0000	0.000E+00	0.0000	1.239E-01	0.0530	1.669E-02	0.0071	2.304E-03	0.0010	2.465E-03	0.0011
U-238	4.669E-03	0.0020	1.872E-05	0.0000	0.000E+00	0.0000	7.124E-03	0.0031	2.683E-04	0.0001	1.964E-03	0.0008	2.988E-04	0.0001
Total	4.022E-02	0.0172	1.584E-04	0.0001	0.000E+00	0.0000	1.507E-01	0.0646	1.755E-02	0.0075	7.421E-03	0.0032	3.186E-03	0.0014

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	5.782E-01	0.2476	0.000E+00	0.0000	0.000E+00	0.0000	8.006E-02	0.0343	2.788E-03	0.0012	3.120E-02	0.0134	7.198E-01	0.3083
U-235	6.411E-01	0.2746	0.000E+00	0.0000	0.000E+00	0.0000	8.878E-02	0.0380	5.231E-03	0.0022	2.955E-02	0.0127	9.421E-01	0.4035
U-238	5.502E-01	0.2356	0.000E+00	0.0000	0.000E+00	0.0000	7.618E-02	0.0326	2.636E-03	0.0011	2.974E-02	0.0127	6.731E-01	0.2883
Total	1.770E+00	0.7578	0.000E+00	0.0000	0.000E+00	0.0000	2.450E-01	0.1049	1.066E-02	0.0046	9.049E-02	0.0388	2.335E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	3.347E-02	3.522E-02	3.870E-02	5.077E-02	8.414E-02	1.160E-01	1.892E-01	4.092E-01	6.992E-01
U-234	Th-230	1.000E+00	0.000E+00	3.310E-07	7.614E-07	2.296E-06	6.916E-06	1.186E-05	2.544E-05	9.107E-05	2.749E-04
U-234	Ra-226	1.000E+00	0.000E+00	1.133E-08	6.147E-08	5.654E-07	5.004E-06	1.430E-05	6.189E-05	6.999E-04	9.962E-03
U-234	Pb-210	1.000E+00	0.000E+00	2.881E-10	3.073E-09	7.520E-08	1.663E-06	6.966E-06	4.640E-05	7.964E-04	1.040E-02
U-234	∑DSR(j)		3.347E-02	3.522E-02	3.870E-02	5.077E-02	8.416E-02	1.160E-01	1.894E-01	4.108E-01	7.198E-01
U-235	U-235	1.000E+00	3.158E-02	3.323E-02	3.652E-02	4.790E-02	7.940E-02	1.094E-01	1.786E-01	3.867E-01	6.877E-01
U-235	Pa-231	1.000E+00	0.000E+00	1.524E-04	3.612E-04	1.110E-03	3.396E-03	5.883E-03	1.286E-02	4.776E-02	1.492E-01
U-235	Ac-227	1.000E+00	0.000E+00	1.420E-06	6.922E-06	5.733E-05	4.319E-04	1.081E-03	3.564E-03	2.071E-02	1.052E-01
U-235	∑DSR(j)		3.158E-02	3.338E-02	3.689E-02	4.907E-02	8.322E-02	1.164E-01	1.950E-01	4.552E-01	9.421E-01
U-238	U-238	1.000E+00	3.184E-02	3.350E-02	3.681E-02	4.828E-02	8.001E-02	1.103E-01	1.800E-01	3.897E-01	6.711E-01
U-238	U-234	1.000E+00	0.000E+00	1.502E-07	3.845E-07	1.512E-06	7.277E-06	1.661E-05	5.393E-05	3.487E-04	1.986E-03
U-238	Th-230	1.000E+00	0.000E+00	7.512E-13	3.852E-12	3.424E-11	2.959E-10	8.324E-10	3.476E-09	3.400E-08	2.424E-07
U-238	Ra-226	1.000E+00	0.000E+00	1.728E-14	2.063E-13	5.602E-12	1.429E-10	6.720E-10	5.701E-09	1.807E-07	6.784E-06
U-238	Pb-210	1.000E+00	0.000E+00	4.256E-15	2.724E-14	7.454E-13	3.890E-11	2.691E-10	3.726E-09	2.038E-07	8.840E-06
U-238	∑DSR(j)		3.184E-02	3.350E-02	3.681E-02	4.828E-02	8.002E-02	1.103E-01	1.800E-01	3.901E-01	6.731E-01

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

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 25 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	7.469E+02	7.098E+02	6.459E+02	4.924E+02	2.971E+02	2.155E+02	1.320E+02	6.086E+01	3.473E+01
U-235	7.904E+02	7.488E+02	6.778E+02	5.095E+02	3.004E+02	2.148E+02	1.282E+02	5.492E+01	2.654E+01
U-238	7.853E+02	7.463E+02	6.792E+02	5.178E+02	3.124E+02	2.267E+02	1.389E+02	6.409E+01	3.714E+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 = 1.000E+03 years

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
U-234	1.000E+00	1.000E+03	7.198E-01	3.473E+01	7.198E-01	3.473E+01
U-235	1.000E+00	1.000E+03	9.421E-01	2.654E+01	9.421E-01	2.654E+01
U-238	1.000E+00	1.000E+03	6.731E-01	3.714E+01	6.731E-01	3.714E+01

Summary : Resident Farmer Colonie Site Specific for Uranium with Cover

File : RESFARUC.RAD

Individual Nuclide Dose Summed Over All Pathways

Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr								
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	3.347E-02	3.522E-02	3.870E-02	5.077E-02	8.414E-02	1.160E-01	1.892E-01	4.092E-01	6.992E-01
U-234	U-238	1.000E+00	4.786E-08	1.502E-07	3.845E-07	1.512E-06	7.277E-06	1.661E-05	5.393E-05	3.487E-04	1.986E-03
U-234	∑DOSE(j):		3.347E-02	3.522E-02	3.870E-02	5.077E-02	8.415E-02	1.160E-01	1.893E-01	4.095E-01	7.012E-01
Th-230	U-234	1.000E+00	1.170E-07	3.310E-07	7.614E-07	2.296E-06	6.916E-06	1.186E-05	2.544E-05	9.107E-05	2.749E-04
Th-230	U-238	1.000E+00	1.153E-13	7.512E-13	3.852E-12	3.424E-11	2.959E-10	8.324E-10	3.476E-09	3.400E-08	2.424E-07
Th-230	∑DOSE(j):		1.170E-07	3.310E-07	7.614E-07	2.296E-06	6.916E-06	1.186E-05	2.544E-05	9.111E-05	2.752E-04
Ra-226	U-234	1.000E+00	1.537E-09	1.133E-08	6.147E-08	5.654E-07	5.004E-06	1.430E-05	6.189E-05	6.999E-04	9.962E-03
Ra-226	U-238	1.000E+00	1.101E-15	1.728E-14	2.063E-13	5.602E-12	1.429E-10	6.720E-10	5.701E-09	1.807E-07	6.784E-06
Ra-226	∑DOSE(j):		1.537E-09	1.133E-08	6.147E-08	5.654E-07	5.004E-06	1.430E-05	6.190E-05	7.001E-04	9.968E-03
Pb-210	U-234	1.000E+00	2.204E-11	2.881E-10	3.073E-09	7.520E-08	1.663E-06	6.966E-06	4.640E-05	7.964E-04	1.040E-02
Pb-210	U-238	1.000E+00	5.010E-16	4.256E-15	2.724E-14	7.454E-13	3.890E-11	2.691E-10	3.726E-09	2.038E-07	8.840E-06
Pb-210	∑DOSE(j):		2.204E-11	2.881E-10	3.073E-09	7.520E-08	1.663E-06	6.966E-06	4.640E-05	7.966E-04	1.041E-02
U-235	U-235	1.000E+00	3.158E-02	3.323E-02	3.652E-02	4.790E-02	7.940E-02	1.094E-01	1.786E-01	3.867E-01	6.877E-01
Pa-231	U-235	1.000E+00	4.894E-05	1.524E-04	3.612E-04	1.110E-03	3.396E-03	5.883E-03	1.286E-02	4.776E-02	1.492E-01
Ac-227	U-235	1.000E+00	2.341E-07	1.420E-06	6.922E-06	5.733E-05	4.319E-04	1.081E-03	3.564E-03	2.071E-02	1.052E-01
U-238	U-238	1.000E+00	3.184E-02	3.350E-02	3.681E-02	4.828E-02	8.001E-02	1.103E-01	1.800E-01	3.897E-01	6.711E-01

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

Summary : Resident Farmer Colonie Site Specific for Uranium with Cover

File : RESFARUC.RAD

Individual Nuclide Soil Concentration

Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g							
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	1.000E+00	9.975E-01	9.924E-01	9.749E-01	9.266E-01	8.808E-01	7.757E-01	4.668E-01	7.892E-02
U-234	U-238	1.000E+00	0.000E+00	2.828E-06	8.440E-06	2.764E-05	7.881E-05	1.249E-04	2.200E-04	3.972E-04	2.241E-04
U-234	∑S(j):		1.000E+00	9.975E-01	9.924E-01	9.750E-01	9.267E-01	8.809E-01	7.760E-01	4.672E-01	7.914E-02
Th-230	U-234	1.000E+00	0.000E+00	8.990E-06	2.690E-05	8.888E-05	2.600E-04	4.226E-04	7.946E-04	1.887E-03	3.244E-03
Th-230	U-238	1.000E+00	0.000E+00	1.274E-11	1.143E-10	1.255E-09	1.092E-08	2.932E-08	1.079E-07	7.021E-07	2.841E-06
Th-230	∑S(j):		0.000E+00	8.990E-06	2.690E-05	8.888E-05	2.600E-04	4.226E-04	7.947E-04	1.888E-03	3.247E-03
Ra-226	U-234	1.000E+00	0.000E+00	1.948E-09	1.749E-08	1.929E-07	1.698E-06	4.616E-06	1.749E-05	1.278E-04	7.402E-04
Ra-226	U-238	1.000E+00	0.000E+00	1.840E-15	4.953E-14	1.816E-12	4.763E-11	2.142E-10	1.595E-09	3.248E-08	4.852E-07
Ra-226	∑S(j):		0.000E+00	1.948E-09	1.749E-08	1.929E-07	1.698E-06	4.616E-06	1.750E-05	1.278E-04	7.406E-04
Pb-210	U-234	1.000E+00	0.000E+00	2.003E-11	5.314E-10	1.854E-08	4.260E-07	1.698E-06	9.775E-06	1.045E-04	6.998E-04
Pb-210	U-238	1.000E+00	0.000E+00	1.424E-17	1.134E-15	1.330E-13	9.359E-12	6.326E-11	7.502E-10	2.449E-08	4.496E-07
Pb-210	∑S(j):		0.000E+00	2.003E-11	5.314E-10	1.854E-08	4.260E-07	1.699E-06	9.775E-06	1.045E-04	7.003E-04
U-235	U-235	1.000E+00	1.000E+00	9.975E-01	9.924E-01	9.750E-01	9.267E-01	8.809E-01	7.760E-01	4.672E-01	7.914E-02
Pa-231	U-235	1.000E+00	0.000E+00	2.113E-05	6.320E-05	2.086E-04	6.081E-04	9.853E-04	1.837E-03	4.205E-03	6.134E-03
Ac-227	U-235	1.000E+00	0.000E+00	3.329E-07	2.927E-06	3.004E-05	2.183E-04	4.989E-04	1.310E-03	3.866E-03	6.069E-03
U-238	U-238	1.000E+00	1.000E+00	9.975E-01	9.924E-01	9.750E-01	9.267E-01	8.809E-01	7.760E-01	4.672E-01	7.914E-02

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

C:\RESRAD1\RESMAIN3.EXEexecution time = 277.54 seconds

Total water/soil iteration failures =1629.

RESRAD REPORT – THORIUM RESIDENT FARMER SCENARIO

Part 1: Mixture Sums and Single Radionuclide Guidelines

Summary : Resident Farmer Colonie Site Specific for Thorium with Cover

File : RESFARTC.RAD

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Total Dose Components

Time = 0.000E+00 10

Time = 1.000E+00 11

Time = 3.000E+00 12

Time = 1.000E+01 13

Time = 3.000E+01 14

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Dose Conversion Factor (and Related) Parameter Summary

File: Default.LIB

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Pb-210+D	2.320E-02	2.320E-02	DCF2(1)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2(2)
B-1	Ra-228+D	5.080E-03	5.080E-03	DCF2(3)
B-1	Th-228+D	3.450E-01	3.450E-01	DCF2(4)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(5)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(6)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Pb-210+D	7.270E-03	7.270E-03	DCF3(1)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3(2)
D-1	Ra-228+D	1.440E-03	1.440E-03	DCF3(3)
D-1	Th-228+D	8.080E-04	8.080E-04	DCF3(4)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(5)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(6)
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				
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				
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)
D-34				
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-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(5,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(5,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(5,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(6,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(6,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(6,3)
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)

Dose Conversion Factor (and Related) Parameter Summary (continued)

File: Default.LIB

Menu	Parameter	Current Value	Default	Parameter Name
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)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(5,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(5,2)
D-5				
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(6,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(6,2)

Summary : Resident Farmer Colonie Site Specific for Thorium with Cover

File : RESFARTC.RAD

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.400E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.000E+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)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	5.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Th-230	1.000E+00	0.000E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): Th-232	1.000E+00	0.000E+00	---	S1(6)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(6)
R013	Cover depth (m)	6.096E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.431E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.150E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	3.500E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.990E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.830E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	3.120E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	3.500E+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)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW

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	0	1	---	NS
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	3.000E+05	6.000E+04	---	DCNUCC(5)
R016	Saturated zone (cm**3/g)	3.000E+05	6.000E+04	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.254E-07	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	3.000E+05	6.000E+04	---	DCNUCC(6)
R016	Saturated zone (cm**3/g)	3.000E+05	6.000E+04	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.254E-07	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.835E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.151E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.151E-04	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Th-228				
R016	Contaminated zone (cm**3/g)	3.000E+05	6.000E+04	---	DCNUCC(4)
R016	Saturated zone (cm**3/g)	3.000E+05	6.000E+04	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.254E-07	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.571E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.101E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.120E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.140E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	2.330E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.510E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	4.785E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	1.000E+00	-1	---	FPLANT
R018	Contamination fraction of meat	1.000E+00	-1	---	FMEAT
R018	Contamination fraction of milk	1.000E+00	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	2.710E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	6.325E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	6.000E+01	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R019	Mass loading for foliar deposition (g/m**3)	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	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	2.500E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	1.230E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	1.500E-01	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	0.000E+00	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL

Site-Specific Parameter Summary (continued)

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

Summary : Resident Farmer Colonie Site Specific for Thorium with Cover

File : RESFARTC.RAD

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	2400.00 square meters	Th-230	1.000E+00
Thickness:	2.00 meters	Th-232	1.000E+00
Cover Depth:	0.61 meters		

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 25 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	2.957E-01	6.002E-01	1.119E+00	2.258E+00	3.258E+00	3.588E+00	4.283E+00	7.552E+00	2.350E+01
M(t):	1.183E-02	2.401E-02	4.476E-02	9.034E-02	1.303E-01	1.435E-01	1.713E-01	3.021E-01	9.401E-01

Maximum TDOSE(t): 2.350E+01 mrem/yr at t = 1.000E+03 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	7.675E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.410E-02	0.0815	3.724E-05	0.0001	6.793E-05	0.0002	0.000E+00	0.0000
Th-232	1.129E-04	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	2.536E-01	0.8577	1.871E-03	0.0063	1.589E-02	0.0537	0.000E+00	0.0000
Total	1.136E-04	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	2.777E-01	0.9392	1.908E-03	0.0065	1.595E-02	0.0540	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	2.081E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.353E-11	0.0000	1.349E-12	0.0000	5.483E-12	0.0000	2.421E-02	0.0819
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.715E-01	0.9181
Total	2.081E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.353E-11	0.0000	1.349E-12	0.0000	5.483E-12	0.0000	2.957E-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.
Th-230	2.326E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.522E-02	0.0420	5.105E-05	0.0001	1.796E-04	0.0003	0.000E+00	0.0000
Th-232	4.639E-04	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	5.234E-01	0.8721	5.433E-03	0.0091	4.540E-02	0.0756	0.000E+00	0.0000
Total	4.663E-04	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	5.487E-01	0.9141	5.484E-03	0.0091	4.558E-02	0.0759	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	3.106E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.910E-10	0.0000	2.726E-11	0.0000	8.297E-11	0.0000	2.546E-02	0.0424
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.747E-01	0.9576
Total	3.106E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.910E-10	0.0000	2.726E-11	0.0000	8.297E-11	0.0000	6.002E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	5.552E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.761E-02	0.0247	8.026E-05	0.0001	4.092E-04	0.0004	0.000E+00	0.0000
Th-232	1.491E-03	0.0013	0.000E+00	0.0000	0.000E+00	0.0000	9.826E-01	0.8781	1.147E-02	0.0103	9.529E-02	0.0852	0.000E+00	0.0000
Total	1.496E-03	0.0013	0.000E+00	0.0000	0.000E+00	0.0000	1.010E+00	0.9028	1.155E-02	0.0103	9.570E-02	0.0855	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	3.506E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.653E-09	0.0000	3.535E-10	0.0000	9.426E-10	0.0000	2.811E-02	0.0251
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.091E+00	0.9749
Total	3.506E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.653E-09	0.0000	3.535E-10	0.0000	9.426E-10	0.0000	1.119E+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.
Th-230	1.805E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.735E-02	0.0165	1.976E-04	0.0001	1.273E-03	0.0006	0.000E+00	0.0000
Th-232	5.230E-03	0.0023	0.000E+00	0.0000	0.000E+00	0.0000	1.986E+00	0.8795	2.458E-02	0.0109	2.035E-01	0.0901	0.000E+00	0.0000
Total	5.248E-03	0.0023	0.000E+00	0.0000	0.000E+00	0.0000	2.024E+00	0.8960	2.478E-02	0.0110	2.048E-01	0.0907	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	8.093E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.106E-07	0.0000	8.783E-09	0.0000	2.184E-08	0.0000	3.884E-02	0.0172
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.220E+00	0.9828
Total	8.093E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.106E-07	0.0000	8.783E-09	0.0000	2.184E-08	0.0000	2.258E+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.
Th-230	6.598E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.516E-02	0.0231	6.428E-04	0.0002	4.196E-03	0.0013	0.000E+00	0.0000
Th-232	1.031E-02	0.0032	0.000E+00	0.0000	0.000E+00	0.0000	2.837E+00	0.8709	3.559E-02	0.0109	2.945E-01	0.0904	0.000E+00	0.0000
Total	1.038E-02	0.0032	0.000E+00	0.0000	0.000E+00	0.0000	2.912E+00	0.8940	3.624E-02	0.0111	2.987E-01	0.0917	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	1.327E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.830E-06	0.0000	1.475E-07	0.0000	3.584E-07	0.0000	8.008E-02	0.0246
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.177E+00	0.9754
Total	1.327E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.830E-06	0.0000	1.475E-07	0.0000	3.584E-07	0.0000	3.258E+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+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.
Th-230	1.375E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.245E-01	0.0347	1.217E-03	0.0003	7.683E-03	0.0021	0.000E+00	0.0000
Th-232	1.329E-02	0.0037	0.000E+00	0.0000	0.000E+00	0.0000	3.082E+00	0.8590	3.870E-02	0.0108	3.201E-01	0.0892	0.000E+00	0.0000
Total	1.343E-02	0.0037	0.000E+00	0.0000	0.000E+00	0.0000	3.207E+00	0.8937	3.992E-02	0.0111	3.278E-01	0.0914	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
Th-230	4.080E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.639E-06	0.0000	4.557E-07	0.0000	1.102E-06	0.0000	1.336E-01	0.0372
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.454E+00	0.9628
Total	4.080E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.639E-06	0.0000	4.557E-07	0.0000	1.102E-06	0.0000	3.588E+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+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	4.863E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	2.834E-01	0.0662	3.053E-03	0.0007	1.834E-02	0.0043	0.000E+00	0.0000
Th-232	2.318E-02	0.0054	0.000E+00	0.0000	0.000E+00	0.0000	3.542E+00	0.8270	4.448E-02	0.0104	3.679E-01	0.0859	0.000E+00	0.0000
Total	2.367E-02	0.0055	0.000E+00	0.0000	0.000E+00	0.0000	3.825E+00	0.8932	4.753E-02	0.0111	3.862E-01	0.0902	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	1.282E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.774E-05	0.0000	1.437E-06	0.0000	3.463E-06	0.0000	3.055E-01	0.0713
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.977E+00	0.9287
Total	1.282E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.774E-05	0.0000	1.437E-06	0.0000	3.463E-06	0.0000	4.283E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	1.452E-02	0.0019	0.000E+00	0.0000	0.000E+00	0.0000	1.250E+00	0.1655	1.425E-02	0.0019	8.178E-02	0.0108	0.000E+00	0.0000
Th-232	2.148E-01	0.0284	0.000E+00	0.0000	0.000E+00	0.0000	5.353E+00	0.7088	6.723E-02	0.0089	5.561E-01	0.0736	0.000E+00	0.0000
Total	2.294E-01	0.0304	0.000E+00	0.0000	0.000E+00	0.0000	6.604E+00	0.8744	8.148E-02	0.0108	6.379E-01	0.0845	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	1.865E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.583E-05	0.0000	2.094E-06	0.0000	5.039E-06	0.0000	1.361E+00	0.1802
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.191E+00	0.8198
Total	1.865E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.583E-05	0.0000	2.094E-06	0.0000	5.039E-06	0.0000	7.552E+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+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	1.464E+00	0.0623	6.646E-04	0.0000	0.000E+00	0.0000	5.062E+00	0.2154	1.288E-01	0.0055	4.532E-01	0.0193	4.294E-02	0.0018
Th-232	6.948E+00	0.2956	3.976E-03	0.0002	0.000E+00	0.0000	8.152E+00	0.3469	1.608E-01	0.0068	1.016E+00	0.0432	6.962E-02	0.0030
Total	8.412E+00	0.3579	4.641E-03	0.0002	0.000E+00	0.0000	1.321E+01	0.5622	2.896E-01	0.0123	1.469E+00	0.0625	1.126E-01	0.0048

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	3.363E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.658E-06	0.0000	3.777E-07	0.0000	9.088E-07	0.0000	7.152E+00	0.3043
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.635E+01	0.6957
Total	3.363E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.658E-06	0.0000	3.777E-07	0.0000	9.088E-07	0.0000	2.350E+01	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Farmer Colonie Site Specific for Thorium with Cover

File : RESFARTC.RAD

Dose/Source Ratios Summed Over All Pathways

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-230	Th-230	1.000E+00	2.367E-02	2.375E-02	2.391E-02	2.448E-02	2.610E-02	2.773E-02	3.178E-02	4.795E-02	8.350E-02
Th-230	Ra-226	1.000E+00	0.000E+00	1.650E-03	3.916E-03	1.206E-02	3.717E-02	6.493E-02	1.456E-01	6.239E-01	3.948E+00
Th-230	Pb-210	1.000E+00	0.000E+00	5.695E-05	2.792E-04	2.297E-03	1.681E-02	4.096E-02	1.281E-01	6.891E-01	3.120E+00
Th-230	∑DSR(j)		2.367E-02	2.546E-02	2.811E-02	3.884E-02	8.008E-02	1.336E-01	3.055E-01	1.361E+00	7.152E+00
Th-232	Th-232	1.000E+00	1.179E-01	1.183E-01	1.191E-01	1.220E-01	1.301E-01	1.382E-01	1.585E-01	2.395E-01	4.173E-01
Th-232	Ra-228	1.000E+00	0.000E+00	4.521E-01	9.594E-01	2.060E+00	2.984E+00	3.245E+00	3.731E+00	5.686E+00	1.137E+01
Th-232	Th-228	1.000E+00	0.000E+00	4.304E-03	1.227E-02	3.761E-02	6.315E-02	7.082E-02	8.768E-02	2.656E-01	4.560E+00
Th-232	∑DSR(j)		1.179E-01	5.747E-01	1.091E+00	2.220E+00	3.177E+00	3.454E+00	3.977E+00	6.191E+00	1.635E+01

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).

The DSR includes contributions from associated (half-life ≤ 0.5 yr) daughters.

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

Basic Radiation Dose Limit = 25 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-230	1.033E+03	9.820E+02	8.894E+02	6.436E+02	3.122E+02	1.871E+02	8.184E+01	1.837E+01	3.496E+00
Th-232	9.210E+01	4.350E+01	2.292E+01	1.126E+01	7.868E+00	7.238E+00	6.286E+00	4.038E+00	1.529E+00

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

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

at tmin = time of minimum single radionuclide soil guideline

and at tmax = time of maximum total dose = 1.000E+03 years

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin) (pCi/g)	G(i,tmin) (pCi/g)	DSR(i,tmax) (pCi/g)	G(i,tmax) (pCi/g)
Th-230	1.000E+00	1.000E+03	7.152E+00	3.496E+00	7.152E+00	3.496E+00
Th-232	1.000E+00	608 ± 1	1.639E+01	1.526E+00	1.635E+01	1.529E+00

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

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr								
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-230	Th-230	1.000E+00	2.367E-02	2.375E-02	2.391E-02	2.448E-02	2.610E-02	2.773E-02	3.178E-02	4.795E-02	8.350E-02
Ra-226	Th-230	1.000E+00	5.280E-04	1.650E-03	3.916E-03	1.206E-02	3.717E-02	6.493E-02	1.456E-01	6.239E-01	3.948E+00
Pb-210	Th-230	1.000E+00	9.248E-06	5.695E-05	2.792E-04	2.297E-03	1.681E-02	4.096E-02	1.281E-01	6.891E-01	3.120E+00
Th-232	Th-232	1.000E+00	1.179E-01	1.183E-01	1.191E-01	1.220E-01	1.301E-01	1.382E-01	1.585E-01	2.395E-01	4.173E-01
Ra-228	Th-232	1.000E+00	1.524E-01	4.521E-01	9.594E-01	2.060E+00	2.984E+00	3.245E+00	3.731E+00	5.686E+00	1.137E+01
Th-228	Th-232	1.000E+00	1.152E-03	4.304E-03	1.227E-02	3.761E-02	6.315E-02	7.082E-02	8.768E-02	2.656E-01	4.560E+00

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

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g								
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-230	Th-230	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.999E-01	9.997E-01	9.995E-01	9.990E-01	9.971E-01	9.905E-01
Ra-226	Th-230	1.000E+00	0.000E+00	4.331E-04	1.298E-03	4.316E-03	1.285E-02	2.126E-02	4.172E-02	1.162E-01	3.034E-01
Pb-210	Th-230	1.000E+00	0.000E+00	6.661E-06	5.868E-05	6.059E-04	4.485E-03	1.044E-02	2.878E-02	1.031E-01	2.914E-01
Th-232	Th-232	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.999E-01	9.998E-01	9.995E-01
Ra-228	Th-232	1.000E+00	0.000E+00	1.135E-01	3.033E-01	6.996E-01	9.708E-01	9.950E-01	9.973E-01	9.972E-01	9.969E-01
Th-228	Th-232	1.000E+00	0.000E+00	1.864E-02	1.243E-01	5.638E-01	9.575E-01	9.938E-01	9.973E-01	9.972E-01	9.969E-01

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

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RESRAD REPORT – URANIUM URBAN RESIDENT SCENARIO

Part 1: Mixture Sums and Single Radionuclide Guidelines

Summary : Resident Colonie Site Specific for Uranium with Cover

File : RESUCOV.RAD

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Dose Conversion Factor (and Related) Parameter Summary

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

Dose Conversion Factor (and Related) Parameter Summary (continued)
File: Default.LIB

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

Summary : Resident Colonie Site Specific for Uranium with Cover

File : RESUCOV.RAD

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.400E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.000E+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)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	5.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): U-234	1.000E+00	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): U-235	1.000E+00	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): U-238	1.000E+00	0.000E+00	---	S1(8)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(8)
R013	Cover depth (m)	6.096E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.431E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.150E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	3.500E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.990E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.830E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	Romberg failures occurred	EPS
R014	Density of saturated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	3.120E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	3.500E+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)	1.000E+01	1.000E+01	---	DWIBWT

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	6.200E+01	5.000E+01	---	DCNUCC(6)
R016	Saturated zone (cm**3/g)	6.200E+01	5.000E+01	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.536E-03	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	6.200E+01	5.000E+01	---	DCNUCC(7)
R016	Saturated zone (cm**3/g)	6.200E+01	5.000E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.536E-03	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	6.200E+01	5.000E+01	---	DCNUCC(8)
R016	Saturated zone (cm**3/g)	6.200E+01	5.000E+01	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.536E-03	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	4.200E+02	2.000E+01	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	4.200E+02	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.752E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Pa-231				
R016	Contaminated zone (cm**3/g)	5.100E+02	5.000E+01	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	5.100E+02	5.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.090E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.835E-04	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(4)
R016	Saturated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.151E-04	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	3.000E+05	6.000E+04	---	DCNUCC(5)
R016	Saturated zone (cm**3/g)	3.000E+05	6.000E+04	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.254E-07	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.571E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.101E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.120E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.140E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	0.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	2.500E-01	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	2.500E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	1.230E-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):				

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	0.000E+00	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	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	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

Summary : Resident Colonie Site Specific for Uranium with Cover

File : RESUCOV.RAD

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	2400.00 square meters	U-234	1.000E+00
Thickness:	2.00 meters	U-235	1.000E+00
Cover Depth:	0.61 meters	U-238	1.000E+00

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 25 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	2.207E-02	2.212E-02	2.221E-02	2.252E-02	2.344E-02	2.437E-02	2.662E-02	3.500E-02	8.125E-02
M(t):	8.830E-04	8.848E-04	8.883E-04	9.010E-04	9.377E-04	9.747E-04	1.065E-03	1.400E-03	3.250E-03

Maximum TDOSE(t): 1.388E-01 mrem/yr at t = 609 ± 1 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 = 6.095E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	1.921E-03	0.0138	5.793E-05	0.0004	0.000E+00	0.0000	6.623E-03	0.0477	0.000E+00	0.0000	0.000E+00	0.0000	9.071E-04	0.0065
U-235	7.587E-02	0.5467	1.430E-04	0.0010	0.000E+00	0.0000	3.223E-02	0.2322	0.000E+00	0.0000	0.000E+00	0.0000	2.826E-03	0.0204
U-238	1.257E-02	0.0906	5.033E-05	0.0004	0.000E+00	0.0000	4.786E-03	0.0345	0.000E+00	0.0000	0.000E+00	0.0000	8.035E-04	0.0058
Total	9.036E-02	0.6511	2.513E-04	0.0018	0.000E+00	0.0000	4.364E-02	0.3144	0.000E+00	0.0000	0.000E+00	0.0000	4.537E-03	0.0327

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

As mrem/yr and Fraction of Total Dose At t = 6.095E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.509E-03	0.0685
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.111E-01	0.8003
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.821E-02	0.1312
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	1.388E-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.
U-234	8.518E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.617E-03	0.3450	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.981E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	7.198E-03	0.3261	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	1.843E-05	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	7.240E-03	0.3280	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.041E-05	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	2.205E-02	0.9991	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.617E-03	0.3450
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.200E-03	0.3261
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.258E-03	0.3288
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	2.207E-02	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.
U-234	2.265E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.623E-03	0.3447	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	2.016E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	7.228E-03	0.3268	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	1.863E-05	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	7.246E-03	0.3276	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.065E-05	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	2.210E-02	0.9991	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.623E-03	0.3447
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.230E-03	0.3269
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.265E-03	0.3284
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	2.212E-02	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	9.455E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.637E-03	0.3439	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	2.087E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	7.291E-03	0.3283	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	1.903E-05	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	7.259E-03	0.3269	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.112E-05	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	2.219E-02	0.9990	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.637E-03	0.3439
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.293E-03	0.3284
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.278E-03	0.3277
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	2.221E-02	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.
U-234	8.552E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.682E-03	0.3410	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	2.355E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	7.519E-03	0.3338	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	2.050E-05	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	7.301E-03	0.3242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.285E-05	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	2.250E-02	0.9990	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.682E-03	0.3410
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.521E-03	0.3339
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.322E-03	0.3251
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	2.252E-02	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.
U-234	8.876E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.789E-03	0.3322	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	3.336E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	8.224E-03	0.3508	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	2.534E-05	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	7.402E-03	0.3157	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.869E-05	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	2.342E-02	0.9988	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.789E-03	0.3322
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.227E-03	0.3509
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.427E-03	0.3168
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	2.344E-02	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+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.
U-234	3.017E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.869E-03	0.3229	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	4.730E-06	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	8.987E-03	0.3688	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	3.134E-05	0.0013	0.000E+00	0.0000	0.000E+00	0.0000	7.475E-03	0.3068	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	3.610E-05	0.0015	0.000E+00	0.0000	0.000E+00	0.0000	2.433E-02	0.9985	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.869E-03	0.3229
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.992E-03	0.3690
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.506E-03	0.3080
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	2.437E-02	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	2.049E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.970E-03	0.2994	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.134E-05	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	1.103E-02	0.4145	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	5.328E-05	0.0020	0.000E+00	0.0000	0.000E+00	0.0000	7.551E-03	0.2837	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	6.482E-05	0.0024	0.000E+00	0.0000	0.000E+00	0.0000	2.656E-02	0.9976	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.970E-03	0.2994
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.105E-02	0.4149
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.605E-03	0.2857
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	2.662E-02	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	1.600E-05	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	7.562E-03	0.2160	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	3.675E-04	0.0105	0.000E+00	0.0000	0.000E+00	0.0000	1.974E-02	0.5638	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	4.452E-04	0.0127	0.000E+00	0.0000	0.000E+00	0.0000	6.878E-03	0.1965	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	8.287E-04	0.0237	0.000E+00	0.0000	0.000E+00	0.0000	3.418E-02	0.9763	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.578E-03	0.2165
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.010E-02	0.5743
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.323E-03	0.2092
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	3.500E-02	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	3.587E-03	0.0441	2.297E-05	0.0003	0.000E+00	0.0000	4.938E-03	0.0608	0.000E+00	0.0000	0.000E+00	0.0000	4.225E-04	0.0052
U-235	3.197E-02	0.3934	1.167E-04	0.0014	0.000E+00	0.0000	3.097E-02	0.3811	0.000E+00	0.0000	0.000E+00	0.0000	2.465E-03	0.0303
U-238	4.669E-03	0.0575	1.872E-05	0.0002	0.000E+00	0.0000	1.781E-03	0.0219	0.000E+00	0.0000	0.000E+00	0.0000	2.988E-04	0.0037
Total	4.022E-02	0.4950	1.584E-04	0.0019	0.000E+00	0.0000	3.768E-02	0.4638	0.000E+00	0.0000	0.000E+00	0.0000	3.186E-03	0.0392

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.970E-03	0.1104
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.552E-02	0.8063
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.767E-03	0.0833
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.125E-02	1.0000

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	7.617E-03	7.623E-03	7.637E-03	7.681E-03	7.786E-03	7.862E-03	7.940E-03	7.223E-03	2.208E-03
U-234	Th-230	1.000E+00	0.000E+00	8.249E-08	1.898E-07	5.724E-07	1.724E-06	2.955E-06	6.337E-06	2.267E-05	8.811E-05
U-234	Ra-226	1.000E+00	0.000E+00	2.525E-09	1.372E-08	1.262E-07	1.116E-06	3.189E-06	1.380E-05	1.652E-04	4.897E-03
U-234	Pb-210	1.000E+00	0.000E+00	6.901E-11	7.348E-10	1.788E-08	3.902E-07	1.614E-06	1.047E-05	1.675E-04	1.777E-03
U-234	∑DSR(j)		7.617E-03	7.623E-03	7.637E-03	7.682E-03	7.789E-03	7.869E-03	7.970E-03	7.578E-03	8.970E-03
U-235	U-235	1.000E+00	7.188E-03	7.194E-03	7.207E-03	7.249E-03	7.350E-03	7.423E-03	7.504E-03	7.167E-03	2.825E-02
U-235	Pa-231	1.000E+00	0.000E+00	3.572E-05	8.446E-05	2.580E-04	7.781E-04	1.331E-03	2.832E-03	9.771E-03	2.313E-02
U-235	Ac-227	1.000E+00	0.000E+00	3.472E-07	1.698E-06	1.388E-05	9.965E-05	2.382E-04	7.099E-04	3.166E-03	1.414E-02
U-235	∑DSR(j)		7.188E-03	7.230E-03	7.293E-03	7.521E-03	8.227E-03	8.992E-03	1.105E-02	2.010E-02	6.552E-02
U-238	U-238	1.000E+00	7.258E-03	7.265E-03	7.278E-03	7.322E-03	7.427E-03	7.505E-03	7.602E-03	7.317E-03	6.757E-03
U-238	U-234	1.000E+00	0.000E+00	3.242E-08	7.578E-08	2.286E-07	6.732E-07	1.126E-06	2.262E-06	6.156E-06	6.272E-06
U-238	Th-230	1.000E+00	0.000E+00	1.870E-13	9.593E-13	8.528E-12	7.369E-11	2.073E-10	8.650E-10	8.448E-09	7.719E-08
U-238	Ra-226	1.000E+00	0.000E+00	3.763E-15	4.553E-14	1.246E-12	3.180E-11	1.493E-10	1.264E-09	4.206E-08	3.211E-06
U-238	Pb-210	1.000E+00	0.000E+00	8.414E-17	1.910E-15	1.363E-13	8.749E-12	6.088E-11	8.088E-10	3.933E-08	1.142E-06
U-238	∑DSR(j)		7.258E-03	7.265E-03	7.278E-03	7.322E-03	7.427E-03	7.506E-03	7.605E-03	7.323E-03	6.767E-03

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

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 25 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	3.282E+03	3.279E+03	3.274E+03	3.255E+03	3.210E+03	3.177E+03	3.137E+03	3.299E+03	2.787E+03
U-235	3.472E+03	3.458E+03	3.428E+03	3.324E+03	3.039E+03	2.780E+03	2.263E+03	1.244E+03	3.816E+02
U-238	3.444E+03	3.441E+03	3.435E+03	3.414E+03	3.366E+03	3.331E+03	3.287E+03	3.414E+03	3.694E+03

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 = 609 ± 1 years

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
U-234	1.000E+00	1.000E+03	8.970E-03	2.787E+03	9.509E-03	2.629E+03
U-235	1.000E+00	609 ± 1	1.111E-01	2.251E+02	1.111E-01	2.251E+02
U-238	1.000E+00	608 ± 1	1.826E-02	1.369E+03	1.821E-02	1.373E+03

Summary : Resident Colonie Site Specific for Uranium with Cover

File : RESUCOV.RAD

Individual Nuclide Dose Summed Over All Pathways

Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr								
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	7.617E-03	7.623E-03	7.637E-03	7.681E-03	7.786E-03	7.862E-03	7.940E-03	7.223E-03	2.208E-03
U-234	U-238	1.000E+00	1.080E-08	3.242E-08	7.578E-08	2.286E-07	6.732E-07	1.126E-06	2.262E-06	6.156E-06	6.272E-06
U-234	∑DOSE(j):		7.617E-03	7.623E-03	7.637E-03	7.681E-03	7.787E-03	7.863E-03	7.942E-03	7.229E-03	2.214E-03
Th-230	U-234	1.000E+00	2.907E-08	8.249E-08	1.898E-07	5.724E-07	1.724E-06	2.955E-06	6.337E-06	2.267E-05	8.811E-05
Th-230	U-238	1.000E+00	2.866E-14	1.870E-13	9.593E-13	8.528E-12	7.369E-11	2.073E-10	8.650E-10	8.448E-09	7.719E-08
Th-230	∑DOSE(j):		2.907E-08	8.249E-08	1.898E-07	5.725E-07	1.724E-06	2.955E-06	6.338E-06	2.268E-05	8.819E-05
Ra-226	U-234	1.000E+00	3.408E-10	2.525E-09	1.372E-08	1.262E-07	1.116E-06	3.189E-06	1.380E-05	1.652E-04	4.897E-03
Ra-226	U-238	1.000E+00	2.341E-16	3.763E-15	4.553E-14	1.246E-12	3.180E-11	1.493E-10	1.264E-09	4.206E-08	3.211E-06
Ra-226	∑DOSE(j):		3.408E-10	2.525E-09	1.372E-08	1.262E-07	1.116E-06	3.189E-06	1.381E-05	1.653E-04	4.900E-03
Pb-210	U-234	1.000E+00	5.288E-12	6.901E-11	7.348E-10	1.788E-08	3.902E-07	1.614E-06	1.047E-05	1.675E-04	1.777E-03
Pb-210	U-238	1.000E+00	3.148E-18	8.414E-17	1.910E-15	1.363E-13	8.749E-12	6.088E-11	8.088E-10	3.933E-08	1.142E-06
Pb-210	∑DOSE(j):		5.288E-12	6.901E-11	7.348E-10	1.788E-08	3.902E-07	1.614E-06	1.047E-05	1.675E-04	1.778E-03
U-235	U-235	1.000E+00	7.188E-03	7.194E-03	7.207E-03	7.249E-03	7.350E-03	7.423E-03	7.504E-03	7.167E-03	2.825E-02
Pa-231	U-235	1.000E+00	1.152E-05	3.572E-05	8.446E-05	2.580E-04	7.781E-04	1.331E-03	2.832E-03	9.771E-03	2.313E-02
Ac-227	U-235	1.000E+00	5.660E-08	3.472E-07	1.698E-06	1.388E-05	9.965E-05	2.382E-04	7.099E-04	3.166E-03	1.414E-02
U-238	U-238	1.000E+00	7.258E-03	7.265E-03	7.278E-03	7.322E-03	7.427E-03	7.505E-03	7.602E-03	7.317E-03	6.757E-03

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

RESRAD REPORT – THORIUM URBAN RESIDENT SCENARIO

Part 1: Mixture Sums and Single Radionuclide Guidelines

Summary : Resident Colonie Site Specific for Thorium with Cover

File : RESTHCOV.RAD

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Summary : Resident Colonie Site Specific for Thorium with Cover

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Dose Conversion Factor (and Related) Parameter Summary

File: Default.LIB

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Pb-210+D	2.320E-02	2.320E-02	DCF2(1)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2(2)
B-1	Ra-228+D	5.080E-03	5.080E-03	DCF2(3)
B-1	Th-228+D	3.450E-01	3.450E-01	DCF2(4)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(5)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(6)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Pb-210+D	7.270E-03	7.270E-03	DCF3(1)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3(2)
D-1	Ra-228+D	1.440E-03	1.440E-03	DCF3(3)
D-1	Th-228+D	8.080E-04	8.080E-04	DCF3(4)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(5)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(6)
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				
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				
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)
D-34				
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-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(5,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(5,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(5,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(6,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(6,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(6,3)
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)

Dose Conversion Factor (and Related) Parameter Summary (continued)

File: Default.LIB

Menu	Parameter	Current Value	Default	Parameter Name
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)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(5,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(5,2)
D-5				
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(6,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(6,2)

Summary : Resident Colonie Site Specific for Thorium with Cover

File : RESTHCOV.RAD

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.400E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.000E+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)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	5.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Th-230	1.000E+00	0.000E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): Th-232	1.000E+00	0.000E+00	---	S1(6)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(6)
R013	Cover depth (m)	6.096E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.431E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.150E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	3.500E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.990E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.830E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	3.120E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	3.500E+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)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW

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	0	1	---	NS
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	3.000E+05	6.000E+04	---	DCNUCC(5)
R016	Saturated zone (cm**3/g)	3.000E+05	6.000E+04	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.254E-07	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	3.000E+05	6.000E+04	---	DCNUCC(6)
R016	Saturated zone (cm**3/g)	3.000E+05	6.000E+04	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.254E-07	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.835E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.151E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.151E-04	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Th-228				
R016	Contaminated zone (cm**3/g)	3.000E+05	6.000E+04	---	DCNUCC(4)
R016	Saturated zone (cm**3/g)	3.000E+05	6.000E+04	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.254E-07	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.571E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.101E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.120E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.140E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	0.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	2.500E-01	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	2.500E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	1.230E-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)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	0.000E+00	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL

Site-Specific Parameter Summary (continued)

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

Summary : Resident Colonie Site Specific for Thorium with Cover

File : RESTHCOV.RAD

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	2400.00 square meters	Th-230	1.000E+00
Thickness:	2.00 meters	Th-232	1.000E+00
Cover Depth:	0.61 meters		

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 25 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	6.964E-02	1.376E-01	2.540E-01	5.112E-01	7.384E-01	8.151E-01	9.799E-01	1.880E+00	1.183E+01
M(t):	2.785E-03	5.505E-03	1.016E-02	2.045E-02	2.954E-02	3.260E-02	3.920E-02	7.521E-02	4.733E-01

Maximum TDOSE(t): 1.183E+01 mrem/yr at t = 1.000E+03 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	7.675E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.026E-03	0.0865	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.129E-04	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	6.350E-02	0.9118	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.136E-04	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	6.952E-02	0.9984	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.026E-03	0.0865
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.361E-02	0.9135
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	6.964E-02	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.
Th-230	2.326E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.306E-03	0.0458	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	4.639E-04	0.0034	0.000E+00	0.0000	0.000E+00	0.0000	1.309E-01	0.9508	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	4.663E-04	0.0034	0.000E+00	0.0000	0.000E+00	0.0000	1.372E-01	0.9966	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.309E-03	0.0458
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.313E-01	0.9542
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	1.376E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	5.552E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.903E-03	0.0272	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.491E-03	0.0059	0.000E+00	0.0000	0.000E+00	0.0000	2.456E-01	0.9669	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.496E-03	0.0059	0.000E+00	0.0000	0.000E+00	0.0000	2.525E-01	0.9941	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.909E-03	0.0272
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.471E-01	0.9728
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	2.540E-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.
Th-230	1.805E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.338E-03	0.0183	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	5.230E-03	0.0102	0.000E+00	0.0000	0.000E+00	0.0000	4.966E-01	0.9715	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.248E-03	0.0103	0.000E+00	0.0000	0.000E+00	0.0000	5.059E-01	0.9897	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.356E-03	0.0183
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.018E-01	0.9817
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	5.112E-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.
Th-230	6.598E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	1.879E-02	0.0254	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.031E-02	0.0140	0.000E+00	0.0000	0.000E+00	0.0000	7.093E-01	0.9605	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.038E-02	0.0141	0.000E+00	0.0000	0.000E+00	0.0000	7.281E-01	0.9859	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.886E-02	0.0255
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.196E-01	0.9745
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	7.384E-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+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.
Th-230	1.375E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	3.113E-02	0.0382	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.329E-02	0.0163	0.000E+00	0.0000	0.000E+00	0.0000	7.705E-01	0.9453	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.343E-02	0.0165	0.000E+00	0.0000	0.000E+00	0.0000	8.016E-01	0.9835	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.127E-02	0.0384
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.838E-01	0.9616
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	8.151E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	4.863E-04	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	7.086E-02	0.0723	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	2.318E-02	0.0237	0.000E+00	0.0000	0.000E+00	0.0000	8.854E-01	0.9035	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.367E-02	0.0242	0.000E+00	0.0000	0.000E+00	0.0000	9.563E-01	0.9758	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.135E-02	0.0728
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.086E-01	0.9272
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.799E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	1.452E-02	0.0077	0.000E+00	0.0000	0.000E+00	0.0000	3.126E-01	0.1662	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	2.148E-01	0.1143	0.000E+00	0.0000	0.000E+00	0.0000	1.338E+00	0.7118	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.294E-01	0.1220	0.000E+00	0.0000	0.000E+00	0.0000	1.651E+00	0.8780	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.271E-01	0.1740
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.553E+00	0.8260
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	1.880E+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+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	1.464E+00	0.1237	6.646E-04	0.0001	0.000E+00	0.0000	1.266E+00	0.1070	0.000E+00	0.0000	0.000E+00	0.0000	4.294E-02	0.0036
Th-232	6.948E+00	0.5872	3.976E-03	0.0003	0.000E+00	0.0000	2.038E+00	0.1722	0.000E+00	0.0000	0.000E+00	0.0000	6.962E-02	0.0059
Total	8.412E+00	0.7109	4.641E-03	0.0004	0.000E+00	0.0000	3.303E+00	0.2792	0.000E+00	0.0000	0.000E+00	0.0000	1.126E-01	0.0095

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.773E+00	0.2343
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.060E+00	0.7657
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	1.183E+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)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-230	Th-230	1.000E+00	5.907E-03	5.927E-03	5.967E-03	6.109E-03	6.514E-03	6.918E-03	7.930E-03	1.196E-02	2.690E-02
Th-230	Ra-226	1.000E+00	0.000E+00	3.681E-04	8.749E-04	2.697E-03	8.319E-03	1.455E-02	3.278E-02	1.501E-01	2.007E+00
Th-230	Pb-210	1.000E+00	0.000E+00	1.365E-05	6.690E-05	5.502E-04	4.023E-03	9.801E-03	3.064E-02	1.650E-01	7.395E-01
Th-230	∑DSR(j)		5.907E-03	6.309E-03	6.909E-03	9.356E-03	1.886E-02	3.127E-02	7.135E-02	3.271E-01	2.773E+00
Th-232	Th-232	1.000E+00	2.942E-02	2.953E-02	2.973E-02	3.044E-02	3.246E-02	3.448E-02	3.954E-02	5.976E-02	1.328E-01
Th-232	Ra-228	1.000E+00	0.000E+00	1.005E-01	2.136E-01	4.589E-01	6.651E-01	7.235E-01	8.332E-01	1.306E+00	4.490E+00
Th-232	Th-228	1.000E+00	0.000E+00	1.250E-03	3.811E-03	1.247E-02	2.206E-02	2.579E-02	3.589E-02	1.873E-01	4.437E+00
Th-232	∑DSR(j)		2.942E-02	1.313E-01	2.471E-01	5.018E-01	7.196E-01	7.838E-01	9.086E-01	1.553E+00	9.060E+00

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

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 25 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-230	4.148E+03	3.963E+03	3.618E+03	2.672E+03	1.326E+03	7.995E+02	3.504E+02	7.643E+01	9.016E+00
Th-232	3.930E+02	1.904E+02	1.012E+02	4.982E+01	3.474E+01	3.190E+01	2.752E+01	1.610E+01	2.759E+00

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

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Th-230	1.000E+00	1.000E+03	2.773E+00	9.016E+00	2.773E+00	9.016E+00
Th-232	1.000E+00	608 ± 1	9.100E+00	2.747E+00	9.060E+00	2.759E+00

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

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr								
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-230	Th-230	1.000E+00	5.907E-03	5.927E-03	5.967E-03	6.109E-03	6.514E-03	6.918E-03	7.930E-03	1.196E-02	2.690E-02
Ra-226	Th-230	1.000E+00	1.178E-04	3.681E-04	8.749E-04	2.697E-03	8.319E-03	1.455E-02	3.278E-02	1.501E-01	2.007E+00
Pb-210	Th-230	1.000E+00	2.221E-06	1.365E-05	6.690E-05	5.502E-04	4.023E-03	9.801E-03	3.064E-02	1.650E-01	7.395E-01
Th-232	Th-232	1.000E+00	2.942E-02	2.953E-02	2.973E-02	3.044E-02	3.246E-02	3.448E-02	3.954E-02	5.976E-02	1.328E-01
Ra-228	Th-232	1.000E+00	3.387E-02	1.005E-01	2.136E-01	4.589E-01	6.651E-01	7.235E-01	8.332E-01	1.306E+00	4.490E+00
Th-228	Th-232	1.000E+00	3.132E-04	1.250E-03	3.811E-03	1.247E-02	2.206E-02	2.579E-02	3.589E-02	1.873E-01	4.437E+00

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

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g								
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-230	Th-230	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.999E-01	9.997E-01	9.995E-01	9.990E-01	9.971E-01	9.905E-01
Ra-226	Th-230	1.000E+00	0.000E+00	4.331E-04	1.298E-03	4.316E-03	1.285E-02	2.126E-02	4.172E-02	1.162E-01	3.034E-01
Pb-210	Th-230	1.000E+00	0.000E+00	6.661E-06	5.868E-05	6.059E-04	4.485E-03	1.044E-02	2.878E-02	1.031E-01	2.914E-01
Th-232	Th-232	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.999E-01	9.998E-01	9.995E-01
Ra-228	Th-232	1.000E+00	0.000E+00	1.135E-01	3.033E-01	6.996E-01	9.708E-01	9.950E-01	9.973E-01	9.972E-01	9.969E-01
Th-228	Th-232	1.000E+00	0.000E+00	1.864E-02	1.243E-01	5.638E-01	9.575E-01	9.938E-01	9.973E-01	9.972E-01	9.969E-01

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

C:\RESRAD1\RESMAIN3.EXEexecution time = 3.13 seconds

Summary : Resident Colonie Site Specific for Uranium with Cover

File : RESUCOV.RAD

Individual Nuclide Soil Concentration

Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g								
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	1.000E+00	9.975E-01	9.924E-01	9.749E-01	9.266E-01	8.808E-01	7.757E-01	4.668E-01	7.892E-02
U-234	U-238	1.000E+00	0.000E+00	2.828E-06	8.440E-06	2.764E-05	7.881E-05	1.249E-04	2.200E-04	3.972E-04	2.241E-04
U-234	∑S(j):		1.000E+00	9.975E-01	9.924E-01	9.750E-01	9.267E-01	8.809E-01	7.760E-01	4.672E-01	7.914E-02
Th-230	U-234	1.000E+00	0.000E+00	8.990E-06	2.690E-05	8.888E-05	2.600E-04	4.226E-04	7.946E-04	1.887E-03	3.244E-03
Th-230	U-238	1.000E+00	0.000E+00	1.274E-11	1.143E-10	1.255E-09	1.092E-08	2.932E-08	1.079E-07	7.021E-07	2.841E-06
Th-230	∑S(j):		0.000E+00	8.990E-06	2.690E-05	8.888E-05	2.600E-04	4.226E-04	7.947E-04	1.888E-03	3.247E-03
Ra-226	U-234	1.000E+00	0.000E+00	1.948E-09	1.749E-08	1.929E-07	1.698E-06	4.616E-06	1.749E-05	1.278E-04	7.402E-04
Ra-226	U-238	1.000E+00	0.000E+00	1.840E-15	4.953E-14	1.816E-12	4.763E-11	2.142E-10	1.595E-09	3.248E-08	4.852E-07
Ra-226	∑S(j):		0.000E+00	1.948E-09	1.749E-08	1.929E-07	1.698E-06	4.616E-06	1.750E-05	1.278E-04	7.406E-04
Pb-210	U-234	1.000E+00	0.000E+00	2.003E-11	5.314E-10	1.854E-08	4.260E-07	1.698E-06	9.775E-06	1.045E-04	6.998E-04
Pb-210	U-238	1.000E+00	0.000E+00	1.424E-17	1.134E-15	1.330E-13	9.359E-12	6.326E-11	7.502E-10	2.449E-08	4.496E-07
Pb-210	∑S(j):		0.000E+00	2.003E-11	5.314E-10	1.854E-08	4.260E-07	1.699E-06	9.775E-06	1.045E-04	7.003E-04
U-235	U-235	1.000E+00	1.000E+00	9.975E-01	9.924E-01	9.750E-01	9.267E-01	8.809E-01	7.760E-01	4.672E-01	7.914E-02
Pa-231	U-235	1.000E+00	0.000E+00	2.113E-05	6.320E-05	2.086E-04	6.081E-04	9.853E-04	1.837E-03	4.205E-03	6.134E-03
Ac-227	U-235	1.000E+00	0.000E+00	3.329E-07	2.927E-06	3.004E-05	2.183E-04	4.989E-04	1.310E-03	3.866E-03	6.069E-03
U-238	U-238	1.000E+00	1.000E+00	9.975E-01	9.924E-01	9.750E-01	9.267E-01	8.809E-01	7.760E-01	4.672E-01	7.914E-02

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

C:\RESRAD1\RESMAIN3.EXEexecution time = 120.84 seconds

Total water/soil iteration failures = 687.

RESRAD REPORT – URANIUM INDUSTRIAL OCCUPANT SCENARIO

Part 1: Mixture Sums and Single Radionuclide Guidelines

Summary : Industrial Colonie Site Specific for Uranium with Cover

File : INDUCOV.RAD

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Dose Conversion Factor (and Related) Parameter Summary

File: Default.LIB

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

Dose Conversion Factor (and Related) Parameter Summary (continued)

File: Default.LIB

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

Summary : Industrial Colonie Site Specific for Uranium with Cover

File : INDUCOV.RAD

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.400E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	5.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): U-234	1.000E+00	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): U-235	1.000E+00	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): U-238	1.000E+00	0.000E+00	---	S1(8)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(8)
R013	Cover depth (m)	6.096E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.431E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.150E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	3.500E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.990E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.830E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	Romberg failures occurred	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	6.200E+01	5.000E+01	---	DCNUCC(6)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.536E-03	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	6.200E+01	5.000E+01	---	DCNUCC(7)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.536E-03	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	6.200E+01	5.000E+01	---	DCNUCC(8)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.536E-03	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	4.200E+02	2.000E+01	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	not used	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.752E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Pa-231				
R016	Contaminated zone (cm**3/g)	5.100E+02	5.000E+01	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.090E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	not used	1.000E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.835E-04	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(4)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.151E-04	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	3.000E+05	6.000E+04	---	DCNUCC(5)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.254E-07	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	1.426E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.426E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI

Site-Specific Parameter Summary (continued)

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

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	0.000E+00	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	513	---	---	KYMAX

Summary of Pathway Selections

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

Summary : Industrial Colonie Site Specific for Uranium with Cover
File : INDUCOV.RAD

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	2400.00 square meters	U-234	1.000E+00
Thickness:	2.00 meters	U-235	1.000E+00
Cover Depth:	0.61 meters	U-238	1.000E+00

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 25 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	9.561E-06	9.669E-06	9.890E-06	1.070E-05	1.344E-05	1.691E-05	3.036E-05	3.881E-04	2.011E-02
M(t):	3.824E-07	3.868E-07	3.956E-07	4.281E-07	5.375E-07	6.763E-07	1.214E-06	1.552E-05	8.043E-04

Maximum TDOSE(t): 4.414E-02 mrem/yr at t = 609 ± 1 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 = 6.094E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	8.996E-04	0.0204	3.101E-05	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.372E-04	0.0076
U-235	3.554E-02	0.8050	7.655E-05	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.051E-03	0.0238
U-238	5.886E-03	0.1334	2.694E-05	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.987E-04	0.0068
Total	4.232E-02	0.9587	1.345E-04	0.0030	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.687E-03	0.0382

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 6.094E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.268E-03	0.0287
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.666E-02	0.8306
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.212E-03	0.1407
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	4.414E-02	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.
U-234	3.989E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	9.279E-07	0.0971	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	8.633E-06	0.9029	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	9.561E-06	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.989E-12	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.279E-07	0.0971
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.633E-06	0.9029
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.561E-06	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	1.061E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	9.441E-07	0.0976	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	8.725E-06	0.9024	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	9.669E-06	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.061E-11	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.441E-07	0.0976
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.725E-06	0.9024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.669E-06	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	4.428E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	9.772E-07	0.0988	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	8.912E-06	0.9012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	9.890E-06	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.428E-11	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.772E-07	0.0988
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.912E-06	0.9012
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.890E-06	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	4.005E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.103E-06	0.1031	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	9.600E-06	0.8969	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.070E-05	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.005E-10	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.103E-06	0.1031
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.600E-06	0.8969
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	1.070E-05	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	4.157E-09	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.562E-06	0.1163	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	1.187E-05	0.8834	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.344E-05	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+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.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.157E-09	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.562E-06	0.1163
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.187E-05	0.8834
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	1.344E-05	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
U-234	1.413E-08	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	2.215E-06	0.1310	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	1.468E-05	0.8681	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.691E-05	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.413E-08	0.0008
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.215E-06	0.1310
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.468E-05	0.8681
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	1.691E-05	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	9.598E-08	0.0032	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	5.311E-06	0.1749	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	2.495E-05	0.8219	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	3.036E-05	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.598E-08	0.0032
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.311E-06	0.1749
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.495E-05	0.8219
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	3.036E-05	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	7.494E-06	0.0193	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.721E-04	0.4435	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	2.085E-04	0.5372	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	3.881E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.494E-06	0.0193
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.721E-04	0.4435
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.085E-04	0.5372
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	3.881E-04	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	1.680E-03	0.0835	1.230E-05	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.571E-04	0.0078
U-235	1.497E-02	0.7446	6.248E-05	0.0031	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.163E-04	0.0456
U-238	2.187E-03	0.1087	1.002E-05	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.111E-04	0.0055
Total	1.884E-02	0.9369	8.480E-05	0.0042	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.184E-03	0.0589

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.849E-03	0.0920
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.595E-02	0.7933
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.308E-03	0.1148
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	2.011E-02	1.0000

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	Branch Fraction*	t=	DSR(j,t) (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00		2.910E-12	2.985E-12	3.139E-12	3.745E-12	6.202E-12	1.027E-11	3.625E-11	5.624E-09	1.339E-04
U-234	Th-230	1.000E+00		0.000E+00	2.671E-16	6.554E-16	2.349E-15	1.136E-14	3.133E-14	2.234E-13	1.116E-10	1.120E-05
U-234	Ra-226	1.000E+00		0.000E+00	7.623E-12	4.114E-11	3.968E-10	4.151E-09	1.412E-08	9.594E-08	7.488E-06	1.677E-03
U-234	Pb-210	1.000E+00		0.000E+00	1.853E-20	2.231E-19	6.637E-18	2.280E-16	1.471E-15	2.918E-14	4.627E-11	2.742E-05
U-234	∑DSR(j)			2.910E-12	1.061E-11	4.428E-11	4.005E-10	4.157E-09	1.413E-08	9.598E-08	7.494E-06	1.849E-03
U-235	U-235	1.000E+00		9.279E-07	9.440E-07	9.771E-07	1.102E-06	1.555E-06	2.194E-06	5.188E-06	1.622E-04	1.238E-02
U-235	Pa-231	1.000E+00		0.000E+00	5.146E-11	1.237E-10	4.126E-10	1.623E-09	3.641E-09	1.549E-08	9.776E-07	5.863E-04
U-235	Ac-227	1.000E+00		0.000E+00	1.201E-11	6.412E-11	5.957E-10	5.672E-09	1.788E-08	1.075E-07	8.984E-06	2.986E-03
U-235	∑DSR(j)			9.279E-07	9.441E-07	9.772E-07	1.103E-06	1.562E-06	2.215E-06	5.311E-06	1.721E-04	1.595E-02
U-238	U-238	1.000E+00		8.633E-06	8.725E-06	8.912E-06	9.600E-06	1.187E-05	1.468E-05	2.495E-05	2.085E-04	2.306E-03
U-238	U-234	1.000E+00		0.000E+00	1.271E-17	3.116E-17	1.115E-16	5.363E-16	1.471E-15	1.033E-14	4.793E-12	3.803E-07
U-238	Th-230	1.000E+00		0.000E+00	5.894E-22	3.271E-21	3.484E-20	4.850E-19	2.195E-18	3.048E-17	4.158E-14	9.813E-09
U-238	Ra-226	1.000E+00		0.000E+00	1.158E-17	1.378E-16	3.929E-15	1.183E-13	6.617E-13	8.788E-12	1.906E-09	1.099E-06
U-238	Pb-210	1.000E+00		0.000E+00	2.177E-26	5.672E-25	5.014E-23	5.096E-21	5.535E-20	2.251E-18	1.086E-14	1.762E-08
U-238	∑DSR(j)			8.633E-06	8.725E-06	8.912E-06	9.600E-06	1.187E-05	1.468E-05	2.495E-05	2.085E-04	2.308E-03

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

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 25 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	6.014E+09	1.769E+09	2.605E+08	3.336E+06	1.352E+04
U-235	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	1.453E+05	1.567E+03
U-238	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	1.199E+05	1.083E+04

*At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 609 ± 1 years

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
U-234	1.000E+00	1.000E+03	1.849E-03	1.352E+04	1.268E-03	1.972E+04
U-235	1.000E+00	610 ± 1	3.666E-02	6.820E+02	3.666E-02	6.819E+02
U-238	1.000E+00	609 ± 1	6.227E-03	4.015E+03	6.212E-03	4.024E+03

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

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	2.910E-12	2.985E-12	3.139E-12	3.745E-12	6.202E-12	1.027E-11	3.625E-11	5.624E-09	1.339E-04
U-234	U-238	1.000E+00	4.142E-18	1.271E-17	3.116E-17	1.115E-16	5.363E-16	1.471E-15	1.033E-14	4.793E-12	3.803E-07
U-234	∑DOSE(j):		2.910E-12	2.985E-12	3.139E-12	3.745E-12	6.203E-12	1.027E-11	3.626E-11	5.629E-09	1.343E-04
Th-230	U-234	1.000E+00	8.705E-17	2.671E-16	6.554E-16	2.349E-15	1.136E-14	3.133E-14	2.234E-13	1.116E-10	1.120E-05
Th-230	U-238	1.000E+00	8.241E-23	5.894E-22	3.271E-21	3.484E-20	4.850E-19	2.195E-18	3.048E-17	4.158E-14	9.813E-09
Th-230	∑DOSE(j):		8.705E-17	2.671E-16	6.554E-16	2.349E-15	1.136E-14	3.133E-14	2.234E-13	1.116E-10	1.121E-05
Ra-226	U-234	1.000E+00	1.079E-12	7.623E-12	4.114E-11	3.968E-10	4.151E-09	1.412E-08	9.594E-08	7.488E-06	1.677E-03
Ra-226	U-238	1.000E+00	7.649E-19	1.158E-17	1.378E-16	3.929E-15	1.183E-13	6.617E-13	8.788E-12	1.906E-09	1.099E-06
Ra-226	∑DOSE(j):		1.079E-12	7.623E-12	4.115E-11	3.968E-10	4.151E-09	1.412E-08	9.595E-08	7.490E-06	1.678E-03
Pb-210	U-234	1.000E+00	1.218E-21	1.853E-20	2.231E-19	6.637E-18	2.280E-16	1.471E-15	2.918E-14	4.627E-11	2.742E-05
Pb-210	U-238	1.000E+00	6.900E-28	2.177E-26	5.672E-25	5.014E-23	5.096E-21	5.535E-20	2.251E-18	1.086E-14	1.762E-08
Pb-210	∑DOSE(j):		1.218E-21	1.853E-20	2.231E-19	6.638E-18	2.280E-16	1.471E-15	2.918E-14	4.628E-11	2.744E-05
U-235	U-235	1.000E+00	9.279E-07	9.440E-07	9.771E-07	1.102E-06	1.555E-06	2.194E-06	5.188E-06	1.622E-04	1.238E-02
Pa-231	U-235	1.000E+00	1.692E-11	5.146E-11	1.237E-10	4.126E-10	1.623E-09	3.641E-09	1.549E-08	9.776E-07	5.863E-04
Ac-227	U-235	1.000E+00	1.708E-12	1.201E-11	6.412E-11	5.957E-10	5.672E-09	1.788E-08	1.075E-07	8.984E-06	2.986E-03
U-238	U-238	1.000E+00	8.633E-06	8.725E-06	8.912E-06	9.600E-06	1.187E-05	1.468E-05	2.495E-05	2.085E-04	2.306E-03

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

Summary : Industrial Colonie Site Specific for Uranium with Cover

File : INDUCOV.RAD

Individual Nuclide Soil Concentration

Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	1.000E+00	9.975E-01	9.924E-01	9.749E-01	9.266E-01	8.808E-01	7.757E-01	4.668E-01	7.892E-02
U-234	U-238	1.000E+00	0.000E+00	2.828E-06	8.440E-06	2.764E-05	7.881E-05	1.249E-04	2.200E-04	3.972E-04	2.241E-04
U-234	∑S(j):		1.000E+00	9.975E-01	9.924E-01	9.750E-01	9.267E-01	8.809E-01	7.760E-01	4.672E-01	7.914E-02
Th-230	U-234	1.000E+00	0.000E+00	8.990E-06	2.690E-05	8.888E-05	2.600E-04	4.226E-04	7.946E-04	1.887E-03	3.244E-03
Th-230	U-238	1.000E+00	0.000E+00	1.274E-11	1.143E-10	1.255E-09	1.092E-08	2.932E-08	1.079E-07	7.021E-07	2.841E-06
Th-230	∑S(j):		0.000E+00	8.990E-06	2.690E-05	8.888E-05	2.600E-04	4.226E-04	7.947E-04	1.888E-03	3.247E-03
Ra-226	U-234	1.000E+00	0.000E+00	1.948E-09	1.749E-08	1.929E-07	1.698E-06	4.616E-06	1.749E-05	1.278E-04	7.402E-04
Ra-226	U-238	1.000E+00	0.000E+00	1.840E-15	4.953E-14	1.816E-12	4.763E-11	2.142E-10	1.595E-09	3.248E-08	4.852E-07
Ra-226	∑S(j):		0.000E+00	1.948E-09	1.749E-08	1.929E-07	1.698E-06	4.616E-06	1.750E-05	1.278E-04	7.406E-04
Pb-210	U-234	1.000E+00	0.000E+00	2.003E-11	5.314E-10	1.854E-08	4.260E-07	1.698E-06	9.775E-06	1.045E-04	6.998E-04
Pb-210	U-238	1.000E+00	0.000E+00	1.424E-17	1.134E-15	1.330E-13	9.359E-12	6.326E-11	7.502E-10	2.449E-08	4.496E-07
Pb-210	∑S(j):		0.000E+00	2.003E-11	5.314E-10	1.854E-08	4.260E-07	1.699E-06	9.775E-06	1.045E-04	7.003E-04
U-235	U-235	1.000E+00	1.000E+00	9.975E-01	9.924E-01	9.750E-01	9.267E-01	8.809E-01	7.760E-01	4.672E-01	7.914E-02
Pa-231	U-235	1.000E+00	0.000E+00	2.113E-05	6.320E-05	2.086E-04	6.081E-04	9.853E-04	1.837E-03	4.205E-03	6.134E-03
Ac-227	U-235	1.000E+00	0.000E+00	3.329E-07	2.927E-06	3.004E-05	2.183E-04	4.989E-04	1.310E-03	3.866E-03	6.069E-03
U-238	U-238	1.000E+00	1.000E+00	9.975E-01	9.924E-01	9.750E-01	9.267E-01	8.809E-01	7.760E-01	4.672E-01	7.914E-02

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

C:\RESRAD1\RESMAIN3.EXEexecution time = 152.91 seconds

Total water/soil iteration failures = 847.

RESRAD REPORT – THORIUM INDUSTRIAL OCCUPANT SCENARIO

Part 1: Mixture Sums and Single Radionuclide Guidelines

Summary : Industrial Colonie Site Specific for Thorium with Cover

File : INDTHCOV.RAD

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Dose Conversion Factor (and Related) Parameter Summary
File: Default.LIB

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Pb-210+D	2.320E-02	2.320E-02	DCF2(1)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2(2)
B-1	Ra-228+D	5.080E-03	5.080E-03	DCF2(3)
B-1	Th-228+D	3.450E-01	3.450E-01	DCF2(4)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(5)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(6)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Pb-210+D	7.270E-03	7.270E-03	DCF3(1)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3(2)
D-1	Ra-228+D	1.440E-03	1.440E-03	DCF3(3)
D-1	Th-228+D	8.080E-04	8.080E-04	DCF3(4)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(5)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(6)
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				
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				
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)
D-34				
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-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(5,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(5,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(5,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(6,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(6,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(6,3)
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)

Dose Conversion Factor (and Related) Parameter Summary (continued)

File: Default.LIB

Menu	Parameter	Current Value	Default	Parameter Name
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)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(5,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(5,2)
D-5				
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(6,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(6,2)

Summary : Industrial Colonie Site Specific for Thorium with Cover
File : INDTHCOV.RAD

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.400E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	5.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Th-230	1.000E+00	0.000E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): Th-232	1.000E+00	0.000E+00	---	S1(6)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(6)
R013	Cover depth (m)	6.096E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.431E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.150E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	3.500E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.990E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.830E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW

Summary : Industrial Colonie Site Specific for Thorium with Cover

File : INDTHCOV.RAD

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	not used	1	---	NS
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	3.000E+05	6.000E+04	---	DCNUCC(5)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.254E-07	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	3.000E+05	6.000E+04	---	DCNUCC(6)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.254E-07	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	not used	1.000E+02	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.835E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.151E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.151E-04	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Th-228				
R016	Contaminated zone (cm**3/g)	3.000E+05	6.000E+04	---	DCNUCC(4)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.254E-07	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	1.426E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.426E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	0.000E+00	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	513	---	---	KYMAX

Summary of Pathway Selections

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

Summary : Industrial Colonie Site Specific for Thorium with Cover

File : INDTHCOV.RAD

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	2400.00 square meters	Th-230	1.000E+00
Thickness:	2.00 meters	Th-232	1.000E+00
Cover Depth:	0.61 meters		

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 25 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	5.322E-05	2.184E-04	7.007E-04	2.458E-03	4.860E-03	6.289E-03	1.109E-02	1.074E-01	3.984E+00
M(t):	2.129E-06	8.735E-06	2.803E-05	9.832E-05	1.944E-04	2.516E-04	4.434E-04	4.297E-03	1.594E-01

Maximum TDOSE(t): 3.984E+00 mrem/yr at t = 1.000E+03 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	3.595E-07	0.0068	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	5.286E-05	0.9932	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.322E-05	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.595E-07	0.0068
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.286E-05	0.9932
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	5.322E-05	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	1.089E-06	0.0050	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	2.173E-04	0.9950	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.184E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 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.
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.089E-06	0.0050
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.173E-04	0.9950
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	2.184E-04	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	2.600E-06	0.0037	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	6.981E-04	0.9963	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	7.007E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.600E-06	0.0037
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.981E-04	0.9963
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	7.007E-04	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+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.
Th-230	8.453E-06	0.0034	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	2.449E-03	0.9966	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.458E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 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.
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.453E-06	0.0034
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.449E-03	0.9966
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	2.458E-03	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+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.
Th-230	3.090E-05	0.0064	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	4.829E-03	0.9936	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	4.860E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 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.
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.090E-05	0.0064
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.829E-03	0.9936
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	4.860E-03	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
Th-230	6.439E-05	0.0102	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	6.225E-03	0.9898	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	6.289E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.439E-05	0.0102
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.225E-03	0.9898
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	6.289E-03	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	2.278E-04	0.0205	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.086E-02	0.9795	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.109E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.278E-04	0.0205
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.086E-02	0.9795
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	1.109E-02	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	6.803E-03	0.0633	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.006E-01	0.9367	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.074E-01	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.803E-03	0.0633
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.006E-01	0.9367
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	1.074E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	6.856E-01	0.1721	3.558E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.596E-02	0.0040
Th-232	3.254E+00	0.8168	2.129E-03	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.588E-02	0.0065
Total	3.940E+00	0.9889	2.484E-03	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.184E-02	0.0105

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.019E-01	0.1762
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.282E+00	0.8238
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	3.984E+00	1.0000

*Sum of all water independent and dependent pathways.

Summary : Industrial Colonie Site Specific for Thorium with Cover

File : INDTHCOV.RAD

Dose/Source Ratios Summed Over All Pathways

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-230	Th-230	1.000E+00	1.927E-11	1.979E-11	2.088E-11	2.518E-11	4.299E-11	7.341E-11	2.797E-10	5.890E-08	3.420E-03
Th-230	Ra-226	1.000E+00	0.000E+00	1.089E-06	2.600E-06	8.453E-06	3.090E-05	6.439E-05	2.278E-04	6.802E-03	6.871E-01
Th-230	Pb-210	1.000E+00	0.000E+00	3.827E-15	2.080E-14	2.060E-13	2.358E-12	8.945E-12	8.545E-11	4.561E-08	1.141E-02
Th-230	∑DSR(j)		1.927E-11	1.089E-06	2.600E-06	8.453E-06	3.090E-05	6.439E-05	2.278E-04	6.803E-03	7.019E-01
Th-232	Th-232	1.000E+00	1.256E-12	1.294E-12	1.374E-12	1.692E-12	3.069E-12	5.565E-12	2.465E-11	9.486E-09	1.607E-02
Th-232	Ra-228	1.000E+00	0.000E+00	9.557E-05	2.042E-04	4.651E-04	8.115E-04	1.068E-03	2.010E-03	2.494E-02	1.207E+00
Th-232	Th-228	1.000E+00	0.000E+00	1.217E-04	4.939E-04	1.984E-03	4.017E-03	5.156E-03	8.848E-03	7.568E-02	2.059E+00
Th-232	∑DSR(j)		1.256E-12	2.173E-04	6.981E-04	2.449E-03	4.829E-03	6.225E-03	1.086E-02	1.006E-01	3.282E+00

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).

The DSR includes contributions from associated (half-life ≤ 0.5 yr) daughters.

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

Basic Radiation Dose Limit = 25 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-230	6.955E+07	2.295E+07	9.615E+06	2.958E+06	8.091E+05	3.882E+05	1.098E+05	3.675E+03	3.562E+01
Th-232	*1.096E+05	*1.096E+05	3.581E+04	1.021E+04	5.177E+03	4.016E+03	2.303E+03	2.484E+02	7.617E+00

*At specific activity limit

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

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Th-230	1.000E+00	1.000E+03	7.019E-01	3.562E+01	7.019E-01	3.562E+01
Th-232	1.000E+00	608 ± 1	3.302E+00	7.572E+00	3.282E+00	7.617E+00

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

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr								
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-230	Th-230	1.000E+00	1.927E-11	1.979E-11	2.088E-11	2.518E-11	4.299E-11	7.341E-11	2.797E-10	5.890E-08	3.420E-03
Ra-226	Th-230	1.000E+00	3.594E-07	1.089E-06	2.600E-06	8.453E-06	3.090E-05	6.439E-05	2.278E-04	6.802E-03	6.871E-01
Pb-210	Th-230	1.000E+00	5.400E-16	3.827E-15	2.080E-14	2.060E-13	2.358E-12	8.945E-12	8.545E-11	4.561E-08	1.141E-02
Th-232	Th-232	1.000E+00	1.256E-12	1.294E-12	1.374E-12	1.692E-12	3.069E-12	5.565E-12	2.465E-11	9.486E-09	1.607E-02
Ra-228	Th-232	1.000E+00	3.320E-05	9.557E-05	2.042E-04	4.651E-04	8.115E-04	1.068E-03	2.010E-03	2.494E-02	1.207E+00
Th-228	Th-232	1.000E+00	1.966E-05	1.217E-04	4.939E-04	1.984E-03	4.017E-03	5.156E-03	8.848E-03	7.568E-02	2.059E+00

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

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g								
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-230	Th-230	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.999E-01	9.997E-01	9.995E-01	9.990E-01	9.971E-01	9.905E-01
Ra-226	Th-230	1.000E+00	0.000E+00	4.331E-04	1.298E-03	4.316E-03	1.285E-02	2.126E-02	4.172E-02	1.162E-01	3.034E-01
Pb-210	Th-230	1.000E+00	0.000E+00	6.661E-06	5.868E-05	6.059E-04	4.485E-03	1.044E-02	2.878E-02	1.031E-01	2.914E-01
Th-232	Th-232	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.999E-01	9.998E-01	9.995E-01
Ra-228	Th-232	1.000E+00	0.000E+00	1.135E-01	3.033E-01	6.996E-01	9.708E-01	9.950E-01	9.973E-01	9.972E-01	9.969E-01
Th-228	Th-232	1.000E+00	0.000E+00	1.864E-02	1.243E-01	5.638E-01	9.575E-01	9.938E-01	9.973E-01	9.972E-01	9.969E-01

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

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APPENDIX E:

RESRAD On-Site Analyses for Metals

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- Table 1, RESRAD input parameters other than NRC or RESRAD default used for lead evaluations
- Table 2, Elemental Transfer Factors Used for Metals
- RESRAD Report – Resident Farmer Colonie Site Specific for Lead with Cover, Part I: Mixture Sums and Single Radionuclide Guidelines
- RESRAD Report – Resident Farmer Colonie Site Specific for Lead with Cover, Part IV: Concentration of Radionuclides
- RESRAD Report – Resident Colonie Site Specific for Lead with Cover, Part I: Part I: Mixture Sums and Single Radionuclide Guidelines
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- RESRAD Report – Industrial Colonie Site Specific for Cadmium with Cover, Part IV: Concentration of Radionuclides

- RESRAD Report – Resident Farmer Colonie Site Specific for Copper with Cover, Part I: Mixture Sums and Single Radionuclide Guidelines

- RESRAD Report – Resident Farmer Colonie Site Specific for Copper with Cover, Part IV: Concentration of Radionuclides

- RESRAD Report – Resident Colonie Site Specific for Copper with Cover, Part I: Part I: Mixture Sums and Single Radionuclide Guidelines

- RESRAD Report – Resident Colonie Site Specific for Copper with Cover, Part IV: Concentration of Radionuclides

- RESRAD Report – Industrial Colonie Site Specific for Copper with Cover, Part I: Part I: Mixture Sums and Single Radionuclide Guidelines

- RESRAD Report – Industrial Colonie Site Specific for Copper with Cover, Part IV: Concentration of Radionuclides

Table 1

RESRAD INPUT PARAMETERS OTHER THAN NRC OR RESRAD DEFAULT[1] VALUES USED FOR METAL EVALUATIONS				
PARAMETER	**UNITS**	**RESRAD DEFAULT**	**VALUE USED**	**REFERENCE**
Initial Principle Radionuclide Th-232	pCi/g	1.0	1.0	Assumed for calculation
Th-232 Plant/Soil Concentration Ratio	-	1E-3	1E-2	Pb, Tl, Cd, Cu values used
Th-232 Beef/Livestock-Intake ratio	(PCi/kg)/(pCi/d)	1E-4	8E-4	Pb, Tl, Cd, Cu values used
Th-232 Milk/Livestock-Intake Ratio	(pCi/L)/(pCi/d)	5E-6	3E-4	Pb, Tl, Cd, Cu values used
Th-232 Bioaccumulation Factors, Fresh Water Fish	L/Kg	1E+2	3E+2	Pb, Tl, Cd, Cu values used
Th-232 Bioaccumulation Factors, Fresh Water Crustacea and Mollusks	L/Kg	5E+2	1E+2	Pb, Tl, Cd, Cu values used
Distribution Coefficients for Th-232, Contaminated Zone	cm^3/g	6E+4	2.7E+2	Pb, Tl, Cd, Cu values used
Distribution Coefficients for Th-232, Saturated Zone	cm^3/g	6E+4	2.7E+2	Pb, Tl, Cd, Cu values used

Notes: 1. All other parameters are the same as used for the Uranium and Thorium RESRAD analyses for Resident Farmer, Urban Resident, and Industrial Occupant.

Table 2

Elemental Transfer Factors for Metals Used Instead of Th-232 Values				
Factor	**Lead**	**Thallium**	**Cadmium**	**Copper**
Plant	0.01 (pCi/kg)/(pCi/kg)	0.2 (pCi/kg)/(pCi/kg)	0.3 (pCi/kg)/(pCi/kg)	0.13 (pCi/kg)/(pCi/kg)
Meat	0.0008 (pCi/kg)/(pCi/d)	0.002 (pCi/kg)/(pCi/d)	0.0004 (pCi/kg)/(pCi/d)	0.01 (pCi/kg)/(pCi/d)
Milk	0.0003 (pCi/L)/(pCi/d)	0.003 (pCi/L)/(pCi/d)	0.001 (pCi/L)/(pCi/d)	0.002 (pCi/L)/(pCi/d)
Fish	300 (pCi/kg)/(pCi/L)	10,000 (pCi/kg)/(pCi/L)	200 (pCi/kg)/(pCi/L)	200 (pCi/kg)/(pCi/L)
Crustacea	100 (pCi/kg)/(pCi/L)	15,000 (pCi/kg)/(pCi/L)	2000 (pCi/kg)/(pCi/L)	400 (pCi/kg)/(pCi/L)
Kd	270 cm^3/g	50 cm^3/g	130 cm^3/g	22 cm^3/g

RESRAD REPORT – RESIDENT FARMER COLONIE SITE SPECIFIC FOR LEAD WITH COVER

Part I: Mixture Sums and Single Radionuclide Guidelines

Summary : Resident Farmer Colonie Site Specific for Lead with Cover

File : RESFARLC.RAD

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Summary : Resident Farmer Colonie Site Specific for Lead with Cover

File : RESFARLC.RAD

Dose Conversion Factor (and Related) Parameter Summary

File: 09492129.LIB

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ra-228+D	5.080E-03	5.080E-03	DCF2(1)
B-1	Th-228+D	3.450E-01	3.450E-01	DCF2(2)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(3)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ra-228+D	1.440E-03	1.440E-03	DCF3(1)
D-1	Th-228+D	8.080E-04	8.080E-04	DCF3(2)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(3)
D-34	Food transfer factors:			
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-03	RTF(2,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	1.000E-04	RTF(2,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	5.000E-06	RTF(2,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-03	RTF(3,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	1.000E-04	RTF(3,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	5.000E-06	RTF(3,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(1,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(1,2)
D-5				
D-5	Th-228+D , fish	3.000E+02	1.000E+02	BIOFAC(2,1)
D-5	Th-228+D , crustacea and mollusks	1.000E+02	5.000E+02	BIOFAC(2,2)
D-5				
D-5	Th-232 , fish	3.000E+02	1.000E+02	BIOFAC(3,1)
D-5	Th-232 , crustacea and mollusks	1.000E+02	5.000E+02	BIOFAC(3,2)

Summary : Resident Farmer Colonie Site Specific for Lead with Cover

File : RESFARLC.RAD

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.400E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.000E+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)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	5.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Th-232	1.000E+00	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(3)
R013	Cover depth (m)	6.096E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.431E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.150E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	3.500E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.990E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.830E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	3.120E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	3.500E+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)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	2.700E+02	6.000E+04	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	2.700E+02	6.000E+04	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.835E-04	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.151E-04	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)	2.700E+02	6.000E+04	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	2.700E+02	6.000E+04	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.835E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.571E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.101E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.120E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.140E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	2.330E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.510E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	4.785E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	1.000E+00	-1	---	FPLANT
R018	Contamination fraction of meat	1.000E+00	-1	---	FMEAT
R018	Contamination fraction of milk	1.000E+00	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	2.710E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	6.325E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	6.000E+01	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	2.500E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	1.230E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	1.500E-01	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	0.000E+00	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	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	active
5 -- milk ingestion	active
6 -- aquatic foods	suppressed
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

Summary : Resident Farmer Colonie Site Specific for Lead with Cover

File : RESFARLC.RAD

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	2400.00 square meters	Th-232	1.000E+00
Thickness:	2.00 meters		
Cover Depth:	0.61 meters		

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 25 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	1.386E+00	1.703E+00	2.264E+00	3.557E+00	4.698E+00	5.037E+00	5.657E+00	7.868E+00	1.236E+01
M(t):	5.545E-02	6.813E-02	9.056E-02	1.423E-01	1.879E-01	2.015E-01	2.263E-01	3.147E-01	4.945E-01

Maximum TDOSE(t): 1.519E+01 mrem/yr at t = 608 ± 1 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 = 6.082E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	4.931E+00	0.3247	2.774E-03	0.0002	0.000E+00	0.0000	8.712E+00	0.5735	2.035E-01	0.0134	9.090E-01	0.0598	4.864E-02	0.0032
Total	4.931E+00	0.3247	2.774E-03	0.0002	0.000E+00	0.0000	8.712E+00	0.5735	2.035E-01	0.0134	9.090E-01	0.0598	4.864E-02	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 = 6.082E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	3.215E-01	0.0212	0.000E+00	0.0000	0.000E+00	0.0000	4.466E-02	0.0029	3.785E-03	0.0002	1.231E-02	0.0008	1.519E+01	1.0000
Total	3.215E-01	0.0212	0.000E+00	0.0000	0.000E+00	0.0000	4.466E-02	0.0029	3.785E-03	0.0002	1.231E-02	0.0008	1.519E+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.
Th-232	1.128E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	1.317E+00	0.9499	1.423E-02	0.0103	5.490E-02	0.0396	0.000E+00	0.0000
Total	1.128E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	1.317E+00	0.9499	1.423E-02	0.0103	5.490E-02	0.0396	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.815E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	2.276E-05	0.0000	1.567E-06	0.0000	4.964E-06	0.0000	1.386E+00	1.0000
Total	1.815E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	2.276E-05	0.0000	1.567E-06	0.0000	4.964E-06	0.0000	1.386E+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.
Th-232	4.637E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	1.599E+00	0.9390	1.793E-02	0.0105	8.489E-02	0.0498	0.000E+00	0.0000
Total	4.637E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	1.599E+00	0.9390	1.793E-02	0.0105	8.489E-02	0.0498	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	5.588E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	7.487E-05	0.0000	5.797E-06	0.0000	1.584E-05	0.0000	1.703E+00	1.0000
Total	5.588E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	7.487E-05	0.0000	5.797E-06	0.0000	1.584E-05	0.0000	1.703E+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+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.
Th-232	1.489E-03	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	2.100E+00	0.9276	2.446E-02	0.0108	1.363E-01	0.0602	0.000E+00	0.0000
Total	1.489E-03	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	2.100E+00	0.9276	2.446E-02	0.0108	1.363E-01	0.0602	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.368E-03	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	1.870E-04	0.0001	1.503E-05	0.0000	4.087E-05	0.0000	2.264E+00	1.0000
Total	1.368E-03	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	1.870E-04	0.0001	1.503E-05	0.0000	4.087E-05	0.0000	2.264E+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.
Th-232	5.209E-03	0.0015	0.000E+00	0.0000	0.000E+00	0.0000	3.257E+00	0.9157	3.933E-02	0.0111	2.498E-01	0.0702	0.000E+00	0.0000
Total	5.209E-03	0.0015	0.000E+00	0.0000	0.000E+00	0.0000	3.257E+00	0.9157	3.933E-02	0.0111	2.498E-01	0.0702	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	4.676E-03	0.0013	0.000E+00	0.0000	0.000E+00	0.0000	6.460E-04	0.0002	5.331E-05	0.0000	1.546E-04	0.0000	3.557E+00	1.0000
Total	4.676E-03	0.0013	0.000E+00	0.0000	0.000E+00	0.0000	6.460E-04	0.0002	5.331E-05	0.0000	1.546E-04	0.0000	3.557E+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.
Th-232	1.017E-02	0.0022	0.000E+00	0.0000	0.000E+00	0.0000	4.273E+00	0.9094	5.222E-02	0.0111	3.448E-01	0.0734	0.000E+00	0.0000
Total	1.017E-02	0.0022	0.000E+00	0.0000	0.000E+00	0.0000	4.273E+00	0.9094	5.222E-02	0.0111	3.448E-01	0.0734	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.561E-02	0.0033	0.000E+00	0.0000	0.000E+00	0.0000	2.165E-03	0.0005	1.816E-04	0.0000	5.645E-04	0.0001	4.698E+00	1.0000
Total	1.561E-02	0.0033	0.000E+00	0.0000	0.000E+00	0.0000	2.165E-03	0.0005	1.816E-04	0.0000	5.645E-04	0.0001	4.698E+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+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.
Th-232	1.297E-02	0.0026	0.000E+00	0.0000	0.000E+00	0.0000	4.566E+00	0.9066	5.585E-02	0.0111	3.697E-01	0.0734	0.000E+00	0.0000
Total	1.297E-02	0.0026	0.000E+00	0.0000	0.000E+00	0.0000	4.566E+00	0.9066	5.585E-02	0.0111	3.697E-01	0.0734	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
Th-232	2.693E-02	0.0053	0.000E+00	0.0000	0.000E+00	0.0000	3.736E-03	0.0007	3.148E-04	0.0001	9.982E-04	0.0002	5.037E+00	1.0000
Total	2.693E-02	0.0053	0.000E+00	0.0000	0.000E+00	0.0000	3.736E-03	0.0007	3.148E-04	0.0001	9.982E-04	0.0002	5.037E+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+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	2.197E-02	0.0039	0.000E+00	0.0000	0.000E+00	0.0000	5.094E+00	0.9006	6.232E-02	0.0110	4.126E-01	0.0729	0.000E+00	0.0000
Total	2.197E-02	0.0039	0.000E+00	0.0000	0.000E+00	0.0000	5.094E+00	0.9006	6.232E-02	0.0110	4.126E-01	0.0729	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	5.508E-02	0.0097	0.000E+00	0.0000	0.000E+00	0.0000	7.648E-03	0.0014	6.464E-04	0.0001	2.080E-03	0.0004	5.657E+00	1.0000
Total	5.508E-02	0.0097	0.000E+00	0.0000	0.000E+00	0.0000	7.648E-03	0.0014	6.464E-04	0.0001	2.080E-03	0.0004	5.657E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.812E-01	0.0230	0.000E+00	0.0000	0.000E+00	0.0000	6.853E+00	0.8710	8.383E-02	0.0107	5.551E-01	0.0705	0.000E+00	0.0000
Total	1.812E-01	0.0230	0.000E+00	0.0000	0.000E+00	0.0000	6.853E+00	0.8710	8.383E-02	0.0107	5.551E-01	0.0705	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.642E-01	0.0209	0.000E+00	0.0000	0.000E+00	0.0000	2.281E-02	0.0029	1.932E-03	0.0002	6.273E-03	0.0008	7.868E+00	1.0000
Total	1.642E-01	0.0209	0.000E+00	0.0000	0.000E+00	0.0000	2.281E-02	0.0029	1.932E-03	0.0002	6.273E-03	0.0008	7.868E+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+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	3.896E+00	0.3152	2.221E-03	0.0002	0.000E+00	0.0000	6.939E+00	0.5612	1.625E-01	0.0131	7.249E-01	0.0586	3.894E-02	0.0031
Total	3.896E+00	0.3152	2.221E-03	0.0002	0.000E+00	0.0000	6.939E+00	0.5612	1.625E-01	0.0131	7.249E-01	0.0586	3.894E-02	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 = 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	5.045E-01	0.0408	0.000E+00	0.0000	0.000E+00	0.0000	7.007E-02	0.0057	5.938E-03	0.0005	1.932E-02	0.0016	1.236E+01	1.0000
Total	5.045E-01	0.0408	0.000E+00	0.0000	0.000E+00	0.0000	7.007E-02	0.0057	5.938E-03	0.0005	1.932E-02	0.0016	1.236E+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)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	1.228E+00	1.232E+00	1.240E+00	1.267E+00	1.344E+00	1.419E+00	1.599E+00	2.218E+00	2.615E+00
Th-232	Ra-228	1.000E+00	0.000E+00	4.542E-01	9.607E-01	2.055E+00	2.950E+00	3.174E+00	3.550E+00	4.836E+00	6.494E+00
Th-232	Th-228	1.000E+00	0.000E+00	1.678E-02	6.329E-02	2.342E-01	4.044E-01	4.436E-01	5.072E-01	8.146E-01	3.255E+00
Th-232	∑DSR(j)		1.228E+00	1.703E+00	2.264E+00	3.557E+00	4.698E+00	5.037E+00	5.657E+00	7.868E+00	1.236E+01

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

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 25 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	1.803E+01	1.468E+01	1.104E+01	7.029E+00	5.321E+00	4.963E+00	4.420E+00	3.177E+00	2.022E+00

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 = 608 ± 1 years

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Th-232	1.000E+00	608 ± 1	1.519E+01	1.646E+00	1.519E+01	1.646E+00

Summary : Resident Farmer Colonie Site Specific for Lead with Cover

File : RESFARLC.RAD

Individual Nuclide Dose Summed Over All Pathways

Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr								
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	1.228E+00	1.232E+00	1.240E+00	1.267E+00	1.344E+00	1.419E+00	1.599E+00	2.218E+00	2.615E+00
Ra-228	Th-232	1.000E+00	1.548E-01	4.542E-01	9.607E-01	2.055E+00	2.950E+00	3.174E+00	3.550E+00	4.836E+00	6.494E+00
Th-228	Th-232	1.000E+00	3.079E-03	1.678E-02	6.329E-02	2.342E-01	4.044E-01	4.436E-01	5.072E-01	8.146E-01	3.255E+00

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

Individual Nuclide Soil Concentration

Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g								
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	1.000E+00	9.994E-01	9.983E-01	9.942E-01	9.826E-01	9.712E-01	9.433E-01	8.394E-01	5.580E-01
Ra-228	Th-232	1.000E+00	0.000E+00	1.135E-01	3.031E-01	6.971E-01	9.582E-01	9.710E-01	9.454E-01	8.413E-01	5.592E-01
Th-228	Th-232	1.000E+00	0.000E+00	1.863E-02	1.241E-01	5.616E-01	9.449E-01	9.699E-01	9.454E-01	8.413E-01	5.592E-01

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

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RESRAD REPORT – RESIDENT FARMER COLONIE SITE SPECIFIC FOR LEAD WITH COVER

Part IV: Concentration of Radionuclides

Concent : Resident Farmer Colonie Site Specific for Lead with Cover
File : RESFARLC.RAD

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Part IV: Concentration of Radionuclides

Concentration of radionuclides in different media
Time= 0.000E+00 2
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Time= 3.000E+00 4
Time= 1.000E+01 5
Time= 3.000E+01 6
Time= 5.000E+01 7
Time= 1.000E+02 8
Time= 3.000E+02 9
Time= 1.000E+03 10

Concentration of radionuclides in environmental media
at t = 0.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 0.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	0.000E+00	3.227E+00	3.227E+00	3.227E+00	3.227E+00	6.995E-02	6.123E-02	0.000E+00	0.000E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	1.135E-01	0.000E+00	0.000E+00	8.122E-06	2.697E-08
Th-228	1.863E-02	0.000E+00	0.000E+00	3.310E-06	1.099E-08
Th-232	9.994E-01	0.000E+00	0.000E+00	2.777E-04	9.218E-07

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	8.110E-06	1.425E+00	1.467E+00	1.394E+00	1.466E+00	3.799E-02	9.274E-02	1.839E-06	6.351E-06
Th-228	3.271E-06	7.495E-02	6.143E-02	5.437E-02	6.004E-02	1.900E-03	1.230E-03	2.984E-06	1.034E-06
Th-232	2.759E-04	3.236E+00	3.236E+00	3.236E+00	3.236E+00	7.016E-02	6.142E-02	2.642E-04	8.806E-05

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	3.031E-01	0.000E+00	0.000E+00	6.800E-05	2.258E-07
Th-228	1.241E-01	0.000E+00	0.000E+00	6.577E-05	2.184E-07
Th-232	9.983E-01	0.000E+00	0.000E+00	8.328E-04	2.765E-06

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	6.798E-05	3.906E+00	3.949E+00	3.891E+00	3.949E+00	1.052E-01	2.497E-01	1.283E-05	5.536E-05
Th-228	6.550E-05	4.450E-01	4.077E-01	3.932E-01	4.043E-01	1.043E-02	7.912E-03	6.322E-05	2.143E-05
Th-232	8.310E-04	3.254E+00	3.255E+00	3.255E+00	3.256E+00	7.061E-02	6.180E-02	8.171E-04	2.724E-04

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	6.971E-01	0.000E+00	0.000E+00	5.986E-04	1.987E-06
Th-228	5.616E-01	0.000E+00	0.000E+00	1.005E-03	3.338E-06
Th-232	9.942E-01	0.000E+00	0.000E+00	2.774E-03	9.208E-06

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	5.987E-04	9.261E+00	9.305E+00	9.281E+00	9.307E+00	2.504E-01	5.885E-01	1.047E-04	4.941E-04
Th-228	1.004E-03	1.971E+00	1.883E+00	1.867E+00	1.876E+00	4.465E-02	3.617E-02	9.875E-04	3.324E-04
Th-232	2.772E-03	3.319E+00	3.322E+00	3.323E+00	3.324E+00	7.216E-02	6.312E-02	2.750E-03	9.167E-04

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	9.582E-01	0.000E+00	0.000E+00	3.202E-03	1.063E-05
Th-228	9.449E-01	0.000E+00	0.000E+00	5.917E-03	1.964E-05
Th-232	9.826E-01	0.000E+00	0.000E+00	8.300E-03	2.756E-05

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	3.202E-03	1.360E+01	1.365E+01	1.365E+01	1.365E+01	3.680E-01	8.633E-01	5.482E-04	2.652E-03
Th-228	5.912E-03	3.506E+00	3.382E+00	3.374E+00	3.375E+00	7.919E-02	6.495E-02	5.844E-03	1.965E-03
Th-232	8.298E-03	3.501E+00	3.510E+00	3.514E+00	3.515E+00	7.652E-02	6.684E-02	8.254E-03	2.751E-03

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 5.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	9.710E-01	0.000E+00	0.000E+00	6.138E-03	2.038E-05
Th-228	9.699E-01	0.000E+00	0.000E+00	1.136E-02	3.772E-05
Th-232	9.712E-01	0.000E+00	0.000E+00	1.380E-02	4.581E-05

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 5.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	6.139E-03	1.464E+01	1.470E+01	1.470E+01	1.470E+01	3.966E-01	9.300E-01	1.047E-03	5.088E-03
Th-228	1.135E-02	3.823E+00	3.695E+00	3.690E+00	3.691E+00	8.668E-02	7.109E-02	1.123E-02	3.777E-03
Th-232	1.380E-02	3.678E+00	3.693E+00	3.700E+00	3.701E+00	8.077E-02	7.047E-02	1.373E-02	4.577E-03

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	9.454E-01	0.000E+00	0.000E+00	1.351E-02	4.485E-05
Th-228	9.454E-01	0.000E+00	0.000E+00	2.501E-02	8.303E-05
Th-232	9.433E-01	0.000E+00	0.000E+00	2.743E-02	9.105E-05

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	1.351E-02	1.635E+01	1.642E+01	1.643E+01	1.643E+01	4.436E-01	1.040E+00	2.299E-03	1.120E-02
Th-228	2.500E-02	4.278E+00	4.148E+00	4.150E+00	4.150E+00	9.792E-02	8.016E-02	2.474E-02	8.319E-03
Th-232	2.742E-02	4.101E+00	4.130E+00	4.146E+00	4.146E+00	9.097E-02	7.917E-02	2.730E-02	9.101E-03

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	8.413E-01	0.000E+00	0.000E+00	4.207E-02	1.397E-04
Th-228	8.413E-01	0.000E+00	0.000E+00	7.789E-02	2.586E-04
Th-232	8.394E-01	0.000E+00	0.000E+00	8.026E-02	2.665E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	4.208E-02	2.201E+01	2.213E+01	2.216E+01	2.216E+01	5.994E-01	1.404E+00	7.151E-03	3.490E-02
Th-228	7.785E-02	5.772E+00	5.644E+00	5.672E+00	5.673E+00	1.354E-01	1.103E-01	7.707E-02	2.592E-02
Th-232	8.026E-02	5.533E+00	5.619E+00	5.665E+00	5.665E+00	1.260E-01	1.089E-01	7.993E-02	2.664E-02

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+03 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	5.592E-01	5.592E-01	2.565E-07	1.305E-01	4.332E-04
Th-228	5.592E-01	5.592E-01	2.565E-07	2.416E-01	8.020E-04
Th-232	5.580E-01	5.580E-01	2.560E-07	2.457E-01	8.157E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+03 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	1.305E-01	2.234E+01	2.255E+01	2.263E+01	2.263E+01	8.959E-01	1.718E+00	2.217E-02	1.082E-01
Th-228	2.414E-01	5.902E+00	5.947E+00	6.072E+00	6.072E+00	3.755E-01	2.049E-01	2.391E-01	8.039E-02
Th-232	2.457E-01	5.660E+00	5.924E+00	6.068E+00	6.068E+00	3.646E-01	2.033E-01	2.447E-01	8.157E-02

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

RESRAD REPORT – RESIDENT COLONIE SITE SPECIFIC FOR LEAD WITH COVER

Part I: Mixture Sums and Single Radionuclide Guidelines

Summary : Resident Colonie Site Specific for Lead with Cover

File : RESPBCOV.RAD

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Dose Conversion Factor (and Related) Parameter Summary

File: 09492129.LIB

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ra-228+D	5.080E-03	5.080E-03	DCF2(1)
B-1	Th-228+D	3.450E-01	3.450E-01	DCF2(2)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(3)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ra-228+D	1.440E-03	1.440E-03	DCF3(1)
D-1	Th-228+D	8.080E-04	8.080E-04	DCF3(2)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(3)
D-34	Food transfer factors:			
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-03	RTF(2,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	1.000E-04	RTF(2,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	5.000E-06	RTF(2,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-03	RTF(3,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	1.000E-04	RTF(3,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	5.000E-06	RTF(3,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(1,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(1,2)
D-5				
D-5	Th-228+D , fish	3.000E+02	1.000E+02	BIOFAC(2,1)
D-5	Th-228+D , crustacea and mollusks	1.000E+02	5.000E+02	BIOFAC(2,2)
D-5				
D-5	Th-232 , fish	3.000E+02	1.000E+02	BIOFAC(3,1)
D-5	Th-232 , crustacea and mollusks	1.000E+02	5.000E+02	BIOFAC(3,2)

Summary : Resident Colonie Site Specific for Lead with Cover

File : RESPBCOV.RAD

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.400E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.000E+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)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	5.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Th-232	1.000E+00	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(3)
R013	Cover depth (m)	6.096E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.431E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.150E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	3.500E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.990E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.830E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	3.120E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	3.500E+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)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	2.700E+02	6.000E+04	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	2.700E+02	6.000E+04	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.835E-04	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.151E-04	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)	2.700E+02	6.000E+04	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	2.700E+02	6.000E+04	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.835E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.571E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.101E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.120E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.140E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	0.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	2.500E-01	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	2.500E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	1.230E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	0.000E+00	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	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	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

Summary : Resident Colonie Site Specific for Lead with Cover

File : RESPBCOV.RAD

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	2400.00 square meters	Th-232	1.000E+00
Thickness:	2.00 meters		
Cover Depth:	0.61 meters		

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 25 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	3.293E-01	4.003E-01	5.266E-01	8.195E-01	1.078E+00	1.155E+00	1.296E+00	1.894E+00	5.672E+00
M(t):	1.317E-02	1.601E-02	2.106E-02	3.278E-02	4.313E-02	4.618E-02	5.182E-02	7.578E-02	2.269E-01

Maximum TDOSE(t): 7.155E+00 mrem/yr at t = 608 ± 1 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 = 6.085E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	4.925E+00	0.6884	2.779E-03	0.0004	0.000E+00	0.0000	2.178E+00	0.3044	0.000E+00	0.0000	0.000E+00	0.0000	4.873E-02	0.0068
Total	4.925E+00	0.6884	2.779E-03	0.0004	0.000E+00	0.0000	2.178E+00	0.3044	0.000E+00	0.0000	0.000E+00	0.0000	4.873E-02	0.0068

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

As mrem/yr and Fraction of Total Dose At t = 6.085E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.155E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.155E+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.
Th-232	1.128E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.292E-01	0.9997	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.128E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.292E-01	0.9997	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.293E-01	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.293E-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.
Th-232	4.637E-04	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	3.998E-01	0.9988	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	4.637E-04	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	3.998E-01	0.9988	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.003E-01	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.003E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+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.
Th-232	1.489E-03	0.0028	0.000E+00	0.0000	0.000E+00	0.0000	5.251E-01	0.9972	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.489E-03	0.0028	0.000E+00	0.0000	0.000E+00	0.0000	5.251E-01	0.9972	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.266E-01	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.266E-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.
Th-232	5.209E-03	0.0064	0.000E+00	0.0000	0.000E+00	0.0000	8.143E-01	0.9936	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.209E-03	0.0064	0.000E+00	0.0000	0.000E+00	0.0000	8.143E-01	0.9936	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.195E-01	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.195E-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.
Th-232	1.017E-02	0.0094	0.000E+00	0.0000	0.000E+00	0.0000	1.068E+00	0.9906	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.017E-02	0.0094	0.000E+00	0.0000	0.000E+00	0.0000	1.068E+00	0.9906	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.078E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.078E+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+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.
Th-232	1.297E-02	0.0112	0.000E+00	0.0000	0.000E+00	0.0000	1.142E+00	0.9888	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.297E-02	0.0112	0.000E+00	0.0000	0.000E+00	0.0000	1.142E+00	0.9888	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.155E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.155E+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+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	2.197E-02	0.0170	0.000E+00	0.0000	0.000E+00	0.0000	1.274E+00	0.9830	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.197E-02	0.0170	0.000E+00	0.0000	0.000E+00	0.0000	1.274E+00	0.9830	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.296E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.296E+00	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Colonie Site Specific for Lead with Cover

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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 = 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.812E-01	0.0956	0.000E+00	0.0000	0.000E+00	0.0000	1.713E+00	0.9044	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.812E-01	0.0956	0.000E+00	0.0000	0.000E+00	0.0000	1.713E+00	0.9044	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.894E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.894E+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+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	3.896E+00	0.6869	2.221E-03	0.0004	0.000E+00	0.0000	1.735E+00	0.3058	0.000E+00	0.0000	0.000E+00	0.0000	3.894E-02	0.0069
Total	3.896E+00	0.6869	2.221E-03	0.0004	0.000E+00	0.0000	1.735E+00	0.3058	0.000E+00	0.0000	0.000E+00	0.0000	3.894E-02	0.0069

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.672E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.672E+00	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Colonie Site Specific for Lead with Cover

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Dose/Source Ratios Summed Over All Pathways

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent	Product	Branch	DSR(j,t) (mrem/yr)/(pCi/g)								
(i)	(j)	Fraction*	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	2.942E-01	2.950E-01	2.967E-01	3.025E-01	3.189E-01	3.348E-01	3.729E-01	5.016E-01	5.312E-01
Th-232	Ra-228	1.000E+00	0.000E+00	1.011E-01	2.139E-01	4.578E-01	6.568E-01	7.065E-01	7.903E-01	1.102E+00	2.519E+00
Th-232	Th-228	1.000E+00	0.000E+00	4.219E-03	1.596E-02	5.920E-02	1.027E-01	1.132E-01	1.324E-01	2.903E-01	2.622E+00
Th-232	∑DSR(j)		2.942E-01	4.003E-01	5.266E-01	8.195E-01	1.078E+00	1.155E+00	1.296E+00	1.894E+00	5.672E+00

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).

The DSR includes contributions from associated (half-life ≤ 0.5 yr) daughters.

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

Basic Radiation Dose Limit = 25 mrem/yr

Nuclide									
(i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	7.592E+01	6.246E+01	4.748E+01	3.051E+01	2.318E+01	2.165E+01	1.930E+01	1.320E+01	4.407E+00

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 = 608 ± 1 years

Nuclide	Initial	tmin	DSR(i,tmin)	G(i,tmin)	DSR(i,tmax)	G(i,tmax)
(i)	pCi/g	(years)		(pCi/g)		(pCi/g)
Th-232	1.000E+00	608 ± 1	7.155E+00	3.494E+00	7.155E+00	3.494E+00

Summary : Resident Colonie Site Specific for Lead with Cover

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Individual Nuclide Dose Summed Over All Pathways

Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr								
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	2.942E-01	2.950E-01	2.967E-01	3.025E-01	3.189E-01	3.348E-01	3.729E-01	5.016E-01	5.312E-01
Ra-228	Th-232	1.000E+00	3.437E-02	1.011E-01	2.139E-01	4.578E-01	6.568E-01	7.065E-01	7.903E-01	1.102E+00	2.519E+00
Th-228	Th-232	1.000E+00	7.706E-04	4.219E-03	1.596E-02	5.920E-02	1.027E-01	1.132E-01	1.324E-01	2.903E-01	2.622E+00

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

Individual Nuclide Soil Concentration

Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g								
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	1.000E+00	9.994E-01	9.983E-01	9.942E-01	9.826E-01	9.712E-01	9.433E-01	8.394E-01	5.580E-01
Ra-228	Th-232	1.000E+00	0.000E+00	1.135E-01	3.031E-01	6.971E-01	9.582E-01	9.710E-01	9.454E-01	8.413E-01	5.592E-01
Th-228	Th-232	1.000E+00	0.000E+00	1.863E-02	1.241E-01	5.616E-01	9.449E-01	9.699E-01	9.454E-01	8.413E-01	5.592E-01

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

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RESRAD REPORT – RESIDENT COLONIE SITE SPECIFIC FOR LEAD WITH COVER

Part IV: Concentration of Radionuclides

Concent : Resident Colonie Site Specific for Lead with Cover
File : RESPBCOV.RAD

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Part IV: Concentration of Radionuclides

Concentration of radionuclides in different media

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Concentration of radionuclides in environmental media
at t = 0.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 0.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	0.000E+00	3.227E+00	3.227E+00	3.227E+00	3.227E+00	6.995E-02	6.123E-02	0.000E+00	0.000E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	1.135E-01	0.000E+00	0.000E+00	8.122E-06	2.697E-08
Th-228	1.863E-02	0.000E+00	0.000E+00	3.310E-06	1.099E-08
Th-232	9.994E-01	0.000E+00	0.000E+00	2.777E-04	9.218E-07

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	8.110E-06	1.425E+00	1.467E+00	1.394E+00	1.466E+00	3.799E-02	9.274E-02	1.839E-06	6.351E-06
Th-228	3.271E-06	7.495E-02	6.143E-02	5.436E-02	6.003E-02	1.900E-03	1.230E-03	2.984E-06	1.034E-06
Th-232	2.759E-04	3.236E+00	3.236E+00	3.235E+00	3.236E+00	7.015E-02	6.141E-02	2.642E-04	8.806E-05

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	3.031E-01	0.000E+00	0.000E+00	6.800E-05	2.258E-07
Th-228	1.241E-01	0.000E+00	0.000E+00	6.577E-05	2.184E-07
Th-232	9.983E-01	0.000E+00	0.000E+00	8.328E-04	2.765E-06

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	6.798E-05	3.906E+00	3.949E+00	3.891E+00	3.949E+00	1.052E-01	2.497E-01	1.283E-05	5.536E-05
Th-228	6.550E-05	4.450E-01	4.076E-01	3.931E-01	4.041E-01	1.043E-02	7.909E-03	6.322E-05	2.143E-05
Th-232	8.310E-04	3.254E+00	3.254E+00	3.254E+00	3.254E+00	7.057E-02	6.176E-02	8.171E-04	2.724E-04

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	6.971E-01	0.000E+00	0.000E+00	5.986E-04	1.987E-06
Th-228	5.616E-01	0.000E+00	0.000E+00	1.005E-03	3.338E-06
Th-232	9.942E-01	0.000E+00	0.000E+00	2.774E-03	9.208E-06

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	5.987E-04	9.260E+00	9.304E+00	9.280E+00	9.306E+00	2.503E-01	5.885E-01	1.047E-04	4.941E-04
Th-228	1.004E-03	1.970E+00	1.881E+00	1.865E+00	1.874E+00	4.461E-02	3.613E-02	9.875E-04	3.324E-04
Th-232	2.772E-03	3.318E+00	3.318E+00	3.318E+00	3.318E+00	7.204E-02	6.302E-02	2.750E-03	9.167E-04

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	9.582E-01	0.000E+00	0.000E+00	3.202E-03	1.063E-05
Th-228	9.449E-01	0.000E+00	0.000E+00	5.917E-03	1.964E-05
Th-232	9.826E-01	0.000E+00	0.000E+00	8.300E-03	2.756E-05

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	3.202E-03	1.359E+01	1.364E+01	1.364E+01	1.364E+01	3.679E-01	8.629E-01	5.482E-04	2.652E-03
Th-228	5.912E-03	3.504E+00	3.374E+00	3.362E+00	3.364E+00	7.894E-02	6.473E-02	5.844E-03	1.965E-03
Th-232	8.298E-03	3.498E+00	3.498E+00	3.498E+00	3.498E+00	7.616E-02	6.653E-02	8.254E-03	2.751E-03

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 5.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	9.710E-01	0.000E+00	0.000E+00	6.138E-03	2.038E-05
Th-228	9.699E-01	0.000E+00	0.000E+00	1.136E-02	3.772E-05
Th-232	9.712E-01	0.000E+00	0.000E+00	1.380E-02	4.581E-05

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 5.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	6.139E-03	1.464E+01	1.469E+01	1.469E+01	1.469E+01	3.963E-01	9.293E-01	1.047E-03	5.088E-03
Th-228	1.135E-02	3.819E+00	3.679E+00	3.668E+00	3.668E+00	8.620E-02	7.066E-02	1.123E-02	3.777E-03
Th-232	1.380E-02	3.673E+00	3.673E+00	3.673E+00	3.673E+00	8.018E-02	6.995E-02	1.373E-02	4.577E-03

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	9.454E-01	0.000E+00	0.000E+00	1.351E-02	4.485E-05
Th-228	9.454E-01	0.000E+00	0.000E+00	2.501E-02	8.303E-05
Th-232	9.433E-01	0.000E+00	0.000E+00	2.743E-02	9.105E-05

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	1.351E-02	1.635E+01	1.640E+01	1.640E+01	1.640E+01	4.428E-01	1.038E+00	2.299E-03	1.120E-02
Th-228	2.500E-02	4.270E+00	4.113E+00	4.101E+00	4.101E+00	9.685E-02	7.922E-02	2.474E-02	8.319E-03
Th-232	2.742E-02	4.092E+00	4.092E+00	4.091E+00	4.092E+00	8.980E-02	7.814E-02	2.730E-02	9.101E-03

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	8.413E-01	0.000E+00	0.000E+00	4.207E-02	1.397E-04
Th-228	8.413E-01	0.000E+00	0.000E+00	7.789E-02	2.586E-04
Th-232	8.394E-01	0.000E+00	0.000E+00	8.026E-02	2.665E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	4.208E-02	2.200E+01	2.207E+01	2.207E+01	2.208E+01	5.972E-01	1.398E+00	7.151E-03	3.490E-02
Th-228	7.785E-02	5.746E+00	5.535E+00	5.519E+00	5.519E+00	1.321E-01	1.074E-01	7.707E-02	2.592E-02
Th-232	8.026E-02	5.506E+00	5.507E+00	5.506E+00	5.507E+00	1.226E-01	1.059E-01	7.993E-02	2.664E-02

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+03 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	5.592E-01	5.592E-01	2.565E-07	1.305E-01	4.332E-04
Th-228	5.592E-01	5.592E-01	2.565E-07	2.416E-01	8.020E-04
Th-232	5.580E-01	5.580E-01	2.560E-07	2.457E-01	8.157E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+03 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	1.305E-01	2.229E+01	2.236E+01	2.237E+01	2.237E+01	8.889E-01	1.702E+00	2.217E-02	1.082E-01
Th-228	2.414E-01	5.823E+00	5.611E+00	5.595E+00	5.595E+00	3.652E-01	1.959E-01	2.391E-01	8.039E-02
Th-232	2.457E-01	5.580E+00	5.582E+00	5.583E+00	5.582E+00	3.540E-01	1.940E-01	2.447E-01	8.157E-02

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

RESRAD REPORT – INDUSTRIAL COLONIE SITE SPECIFIC FOR LEAD WITH COVER

Part I: Mixture Sums and Single Radionuclide Guidelines

Summary : Industrial Colonie Site Specific for Lead with Cover

File : INDPBCOV.RAD

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Summary : Industrial Colonie Site Specific for Lead with Cover

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Dose Conversion Factor (and Related) Parameter Summary

File: 09492129.LIB

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ra-228+D	5.080E-03	5.080E-03	DCF2(1)
B-1	Th-228+D	3.450E-01	3.450E-01	DCF2(2)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(3)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ra-228+D	1.440E-03	1.440E-03	DCF3(1)
D-1	Th-228+D	8.080E-04	8.080E-04	DCF3(2)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(3)
D-34	Food transfer factors:			
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-03	RTF(2,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	1.000E-04	RTF(2,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	5.000E-06	RTF(2,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-03	RTF(3,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	1.000E-04	RTF(3,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	5.000E-06	RTF(3,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(1,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(1,2)
D-5				
D-5	Th-228+D , fish	3.000E+02	1.000E+02	BIOFAC(2,1)
D-5	Th-228+D , crustacea and mollusks	1.000E+02	5.000E+02	BIOFAC(2,2)
D-5				
D-5	Th-232 , fish	3.000E+02	1.000E+02	BIOFAC(3,1)
D-5	Th-232 , crustacea and mollusks	1.000E+02	5.000E+02	BIOFAC(3,2)

Summary : Industrial Colonie Site Specific for Lead with Cover

File : INDPBCOV.RAD

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.400E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	5.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Th-232	1.000E+00	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(3)
R013	Cover depth (m)	6.096E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.431E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.150E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	3.500E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.990E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.830E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	2.700E+02	6.000E+04	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.835E-04	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.151E-04	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)	2.700E+02	6.000E+04	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.835E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	1.426E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.426E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	0.000E+00	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	513	---	---	KYMAX

Summary of Pathway Selections

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

Summary : Industrial Colonie Site Specific for Lead with Cover

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Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	2400.00 square meters	Th-232	1.000E+00
Thickness:	2.00 meters		
Cover Depth:	0.61 meters		

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 25 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	5.285E-05	2.172E-04	6.972E-04	2.440E-03	4.764E-03	6.073E-03	1.029E-02	8.486E-02	1.841E+00
M(t):	2.114E-06	8.687E-06	2.789E-05	9.759E-05	1.906E-04	2.429E-04	4.116E-04	3.395E-03	7.362E-02

Maximum TDOSE(t): 2.326E+00 mrem/yr at t = 608 ± 1 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 = 6.085E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	2.307E+00	0.9916	1.488E-03	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.811E-02	0.0078
Total	2.307E+00	0.9916	1.488E-03	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.811E-02	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 = 6.085E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.326E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.326E+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.
Th-232	5.285E-05	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.285E-05	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.285E-05	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.285E-05	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	2.172E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.172E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 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.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.172E-04	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.172E-04	1.0000

*Sum of all water independent and dependent pathways.

Summary : Industrial Colonie Site Specific for Lead with Cover

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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 = 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	6.972E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	6.972E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.972E-04	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.972E-04	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+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.
Th-232	2.440E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.440E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 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.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.440E-03	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.440E-03	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+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.
Th-232	4.764E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	4.764E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 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.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.764E-03	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.764E-03	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
Th-232	6.073E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	6.073E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.073E-03	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.073E-03	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.029E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.029E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.029E-02	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.029E-02	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	8.486E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	8.486E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.486E-02	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.486E-02	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.825E+00	0.9915	1.189E-03	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.448E-02	0.0079
Total	1.825E+00	0.9915	1.189E-03	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.448E-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 = 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.841E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.841E+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	Product	Branch	DSR(j,t) (mrem/yr)/(pCi/g)								
(i)	(j)	Fraction*	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	1.256E-12	1.293E-12	1.371E-12	1.682E-12	3.015E-12	5.404E-12	2.325E-11	7.962E-09	8.970E-03
Th-232	Ra-228	1.000E+00	0.000E+00	9.552E-05	2.040E-04	4.634E-04	8.007E-04	1.042E-03	1.905E-03	2.103E-02	6.772E-01
Th-232	Th-228	1.000E+00	0.000E+00	1.216E-04	4.933E-04	1.976E-03	3.963E-03	5.030E-03	8.385E-03	6.383E-02	1.154E+00
Th-232	∑DSR(j)		1.256E-12	2.172E-04	6.972E-04	2.440E-03	4.764E-03	6.073E-03	1.029E-02	8.486E-02	1.841E+00

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

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 25 mrem/yr

Nuclide										
(i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	*1.096E+05	*1.096E+05	3.586E+04	1.025E+04	5.248E+03	4.117E+03	2.430E+03	2.946E+02	1.358E+01

*At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 608 ± 1 years

Nuclide	Initial	tmin	DSR(i,tmin)	G(i,tmin)	DSR(i,tmax)	G(i,tmax)
(i)	pCi/g	(years)		(pCi/g)		(pCi/g)
Th-232	1.000E+00	608 ± 1	2.326E+00	1.075E+01	2.326E+00	1.075E+01

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

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr								
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	1.256E-12	1.293E-12	1.371E-12	1.682E-12	3.015E-12	5.404E-12	2.325E-11	7.962E-09	8.970E-03
Ra-228	Th-232	1.000E+00	3.319E-05	9.552E-05	2.040E-04	4.634E-04	8.007E-04	1.042E-03	1.905E-03	2.103E-02	6.772E-01
Th-228	Th-232	1.000E+00	1.966E-05	1.216E-04	4.933E-04	1.976E-03	3.963E-03	5.030E-03	8.385E-03	6.383E-02	1.154E+00

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

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g								
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	1.000E+00	9.994E-01	9.983E-01	9.942E-01	9.826E-01	9.712E-01	9.433E-01	8.394E-01	5.580E-01
Ra-228	Th-232	1.000E+00	0.000E+00	1.135E-01	3.031E-01	6.971E-01	9.582E-01	9.710E-01	9.454E-01	8.413E-01	5.592E-01
Th-228	Th-232	1.000E+00	0.000E+00	1.863E-02	1.241E-01	5.616E-01	9.449E-01	9.699E-01	9.454E-01	8.413E-01	5.592E-01

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

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RESRAD REPORT – INDUSTRIAL COLONIE SITE SPECIFIC FOR LEAD WITH COVER

Part IV: Concentration of Radionuclides

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Part IV: Concentration of Radionuclides

Concentration of radionuclides in different media
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Concentration of radionuclides in environmental media
at t = 0.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 0.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	0.000E+00	3.227E+00	3.227E+00	3.227E+00	3.227E+00	6.995E-02	6.123E-02	0.000E+00	0.000E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	1.135E-01	0.000E+00	0.000E+00	8.122E-06	2.697E-08
Th-228	1.863E-02	0.000E+00	0.000E+00	3.310E-06	1.099E-08
Th-232	9.994E-01	0.000E+00	0.000E+00	2.777E-04	9.218E-07

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	8.110E-06	1.425E+00	1.467E+00	1.394E+00	1.466E+00	3.799E-02	9.274E-02	1.839E-06	6.351E-06
Th-228	3.271E-06	7.495E-02	6.143E-02	5.437E-02	6.004E-02	1.900E-03	1.230E-03	2.984E-06	1.034E-06
Th-232	2.759E-04	3.236E+00	3.236E+00	3.236E+00	3.236E+00	7.016E-02	6.142E-02	2.642E-04	8.806E-05

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	3.031E-01	0.000E+00	0.000E+00	6.800E-05	2.258E-07
Th-228	1.241E-01	0.000E+00	0.000E+00	6.577E-05	2.184E-07
Th-232	9.983E-01	0.000E+00	0.000E+00	8.328E-04	2.765E-06

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	6.798E-05	3.906E+00	3.949E+00	3.891E+00	3.949E+00	1.052E-01	2.497E-01	1.283E-05	5.536E-05
Th-228	6.550E-05	4.450E-01	4.077E-01	3.932E-01	4.043E-01	1.043E-02	7.912E-03	6.322E-05	2.143E-05
Th-232	8.310E-04	3.254E+00	3.255E+00	3.255E+00	3.256E+00	7.061E-02	6.180E-02	8.171E-04	2.724E-04

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	6.971E-01	0.000E+00	0.000E+00	5.986E-04	1.987E-06
Th-228	5.616E-01	0.000E+00	0.000E+00	1.005E-03	3.338E-06
Th-232	9.942E-01	0.000E+00	0.000E+00	2.774E-03	9.208E-06

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	5.987E-04	9.261E+00	9.305E+00	9.281E+00	9.307E+00	2.504E-01	5.885E-01	1.047E-04	4.941E-04
Th-228	1.004E-03	1.971E+00	1.883E+00	1.867E+00	1.876E+00	4.465E-02	3.617E-02	9.875E-04	3.324E-04
Th-232	2.772E-03	3.319E+00	3.322E+00	3.323E+00	3.324E+00	7.216E-02	6.312E-02	2.750E-03	9.167E-04

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	9.582E-01	0.000E+00	0.000E+00	3.202E-03	1.063E-05
Th-228	9.449E-01	0.000E+00	0.000E+00	5.917E-03	1.964E-05
Th-232	9.826E-01	0.000E+00	0.000E+00	8.300E-03	2.756E-05

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	3.202E-03	1.360E+01	1.365E+01	1.365E+01	1.365E+01	3.680E-01	8.633E-01	5.482E-04	2.652E-03
Th-228	5.912E-03	3.506E+00	3.382E+00	3.374E+00	3.375E+00	7.919E-02	6.495E-02	5.844E-03	1.965E-03
Th-232	8.298E-03	3.501E+00	3.510E+00	3.514E+00	3.515E+00	7.652E-02	6.684E-02	8.254E-03	2.751E-03

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 5.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	9.710E-01	0.000E+00	0.000E+00	6.138E-03	2.038E-05
Th-228	9.699E-01	0.000E+00	0.000E+00	1.136E-02	3.772E-05
Th-232	9.712E-01	0.000E+00	0.000E+00	1.380E-02	4.581E-05

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 5.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	6.139E-03	1.464E+01	1.470E+01	1.470E+01	1.470E+01	3.966E-01	9.300E-01	1.047E-03	5.088E-03
Th-228	1.135E-02	3.823E+00	3.695E+00	3.690E+00	3.691E+00	8.668E-02	7.109E-02	1.123E-02	3.777E-03
Th-232	1.380E-02	3.678E+00	3.693E+00	3.700E+00	3.701E+00	8.077E-02	7.047E-02	1.373E-02	4.577E-03

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	9.454E-01	0.000E+00	0.000E+00	1.351E-02	4.485E-05
Th-228	9.454E-01	0.000E+00	0.000E+00	2.501E-02	8.303E-05
Th-232	9.433E-01	0.000E+00	0.000E+00	2.743E-02	9.105E-05

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	1.351E-02	1.635E+01	1.642E+01	1.643E+01	1.643E+01	4.436E-01	1.040E+00	2.299E-03	1.120E-02
Th-228	2.500E-02	4.278E+00	4.148E+00	4.150E+00	4.150E+00	9.792E-02	8.016E-02	2.474E-02	8.319E-03
Th-232	2.742E-02	4.101E+00	4.130E+00	4.146E+00	4.146E+00	9.097E-02	7.917E-02	2.730E-02	9.101E-03

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	8.413E-01	0.000E+00	0.000E+00	4.207E-02	1.397E-04
Th-228	8.413E-01	0.000E+00	0.000E+00	7.789E-02	2.586E-04
Th-232	8.394E-01	0.000E+00	0.000E+00	8.026E-02	2.665E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	4.208E-02	2.201E+01	2.213E+01	2.216E+01	2.216E+01	5.994E-01	1.404E+00	7.151E-03	3.490E-02
Th-228	7.785E-02	5.772E+00	5.644E+00	5.672E+00	5.673E+00	1.354E-01	1.103E-01	7.707E-02	2.592E-02
Th-232	8.026E-02	5.533E+00	5.619E+00	5.665E+00	5.665E+00	1.260E-01	1.089E-01	7.993E-02	2.664E-02

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+03 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	5.592E-01	5.592E-01	2.565E-07	1.305E-01	4.332E-04
Th-228	5.592E-01	5.592E-01	2.565E-07	2.416E-01	8.020E-04
Th-232	5.580E-01	5.580E-01	2.560E-07	2.457E-01	8.157E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+03 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	1.305E-01	2.234E+01	2.255E+01	2.263E+01	2.263E+01	8.959E-01	1.718E+00	2.217E-02	1.082E-01
Th-228	2.414E-01	5.902E+00	5.947E+00	6.072E+00	6.072E+00	3.755E-01	2.049E-01	2.391E-01	8.039E-02
Th-232	2.457E-01	5.660E+00	5.924E+00	6.068E+00	6.068E+00	3.646E-01	2.033E-01	2.447E-01	8.157E-02

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

RESRAD REPORT – RESIDENT FARMER COLONIE SITE SPECIFIC FOR THALLIUM WITH COVER

Part I: Mixture Sums and Single Radionuclide Guidelines

Summary : Resident Farmer Colonie Site Specific for Thallium with Cover
File : RESFRTLC.RAD

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Summary : Resident Farmer Colonie Site Specific for Thallium with Cover

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Dose Conversion Factor (and Related) Parameter Summary

File: 02874392.LIB

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ra-228+D	5.080E-03	5.080E-03	DCF2(1)
B-1	Th-228+D	3.450E-01	3.450E-01	DCF2(2)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(3)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ra-228+D	1.440E-03	1.440E-03	DCF3(1)
D-1	Th-228+D	8.080E-04	8.080E-04	DCF3(2)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(3)
D-34	Food transfer factors:			
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	2.000E-01	1.000E-03	RTF(2,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-03	1.000E-04	RTF(2,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-03	5.000E-06	RTF(2,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	2.000E-01	1.000E-03	RTF(3,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-03	1.000E-04	RTF(3,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-03	5.000E-06	RTF(3,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(1,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(1,2)
D-5				
D-5	Th-228+D , fish	1.000E+04	1.000E+02	BIOFAC(2,1)
D-5	Th-228+D , crustacea and mollusks	1.500E+04	5.000E+02	BIOFAC(2,2)
D-5				
D-5	Th-232 , fish	1.000E+04	1.000E+02	BIOFAC(3,1)
D-5	Th-232 , crustacea and mollusks	1.500E+04	5.000E+02	BIOFAC(3,2)

Summary : Resident Farmer Colonie Site Specific for Thallium with Cover

File : RESFRTLC.RAD

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.400E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.000E+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)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	5.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Th-232	1.000E+00	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(3)
R013	Cover depth (m)	6.096E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.431E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.150E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	3.500E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.990E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.830E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	3.120E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	3.500E+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)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS

Summary : Resident Farmer Colonie Site Specific for Thallium with Cover
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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	5.000E+01	6.000E+04	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	5.000E+01	6.000E+04	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.144E-03	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.151E-04	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)	2.700E+02	6.000E+04	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	2.700E+02	6.000E+04	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.835E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.571E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.101E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.120E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.140E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	2.330E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.510E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	4.785E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	1.000E+00	-1	---	FPLANT
R018	Contamination fraction of meat	1.000E+00	-1	---	FMEAT
R018	Contamination fraction of milk	1.000E+00	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	2.710E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	6.325E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	6.000E+01	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	2.500E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	1.230E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	1.500E-01	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	0.000E+00	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	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	active
5 -- milk ingestion	active
6 -- aquatic foods	suppressed
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

Summary : Resident Farmer Colonie Site Specific for Thallium with Cover

File : RESFRTLC.RAD

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	2400.00 square meters	Th-232	1.000E+00
Thickness:	2.00 meters		
Cover Depth:	0.61 meters		

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 25 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	3.219E+01	3.284E+01	3.454E+01	4.001E+01	4.518E+01	4.613E+01	4.670E+01	4.235E+01	1.386E+01
M(t):	1.288E+00	1.314E+00	1.381E+00	1.600E+00	1.807E+00	1.845E+00	1.868E+00	1.694E+00	5.546E-01

Maximum TDOSE(t): 4.670E+01 mrem/yr at t = 103.1 ± 0.2 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 = 1.031E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.788E-02	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	3.251E+01	0.6961	8.264E-01	0.0177	1.023E+01	0.2191	0.000E+00	0.0000
Total	1.788E-02	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	3.251E+01	0.6961	8.264E-01	0.0177	1.023E+01	0.2191	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 1.031E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	2.166E+00	0.0464	0.000E+00	0.0000	0.000E+00	0.0000	3.163E-01	0.0068	6.007E-02	0.0013	5.715E-01	0.0122	4.670E+01	1.0000
Total	2.166E+00	0.0464	0.000E+00	0.0000	0.000E+00	0.0000	3.163E-01	0.0068	6.007E-02	0.0013	5.715E-01	0.0122	4.670E+01	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Farmer Colonie Site Specific for Thallium with Cover

File : RESFRTLC.RAD

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

As mrem/yr and Fraction of Total Dose At t = 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.
Th-232	1.127E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.373E+01	0.7371	6.265E-01	0.0195	7.822E+00	0.2430	0.000E+00	0.0000
Total	1.127E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.373E+01	0.7371	6.265E-01	0.0195	7.822E+00	0.2430	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.092E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	1.517E-03	0.0000	2.725E-04	0.0000	2.947E-03	0.0001	3.219E+01	1.0000
Total	1.092E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	1.517E-03	0.0000	2.725E-04	0.0000	2.947E-03	0.0001	3.219E+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.
Th-232	4.629E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.423E+01	0.7377	6.361E-01	0.0194	7.930E+00	0.2415	0.000E+00	0.0000
Total	4.629E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.423E+01	0.7377	6.361E-01	0.0194	7.930E+00	0.2415	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	3.295E-02	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	4.739E-03	0.0001	8.955E-04	0.0000	8.914E-03	0.0003	3.284E+01	1.0000
Total	3.295E-02	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	4.739E-03	0.0001	8.955E-04	0.0000	8.914E-03	0.0003	3.284E+01	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Farmer Colonie Site Specific for Thallium with Cover
File : RESFRTLC.RAD

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.483E-03	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.550E+01	0.7384	6.636E-01	0.0192	8.258E+00	0.2391	0.000E+00	0.0000
Total	1.483E-03	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.550E+01	0.7384	6.636E-01	0.0192	8.258E+00	0.2391	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	7.735E-02	0.0022	0.000E+00	0.0000	0.000E+00	0.0000	1.123E-02	0.0003	2.148E-03	0.0001	2.088E-02	0.0006	3.454E+01	1.0000
Total	7.735E-02	0.0022	0.000E+00	0.0000	0.000E+00	0.0000	1.123E-02	0.0003	2.148E-03	0.0001	2.088E-02	0.0006	3.454E+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.
Th-232	5.140E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	2.952E+01	0.7378	7.568E-01	0.0189	9.388E+00	0.2346	0.000E+00	0.0000
Total	5.140E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	2.952E+01	0.7378	7.568E-01	0.0189	9.388E+00	0.2346	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	2.357E-01	0.0059	0.000E+00	0.0000	0.000E+00	0.0000	3.438E-02	0.0009	6.581E-03	0.0002	6.313E-02	0.0016	4.001E+01	1.0000
Total	2.357E-01	0.0059	0.000E+00	0.0000	0.000E+00	0.0000	3.438E-02	0.0009	6.581E-03	0.0002	6.313E-02	0.0016	4.001E+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.
Th-232	9.642E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	3.295E+01	0.7295	8.383E-01	0.0186	1.038E+01	0.2298	0.000E+00	0.0000
Total	9.642E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	3.295E+01	0.7295	8.383E-01	0.0186	1.038E+01	0.2298	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	6.895E-01	0.0153	0.000E+00	0.0000	0.000E+00	0.0000	1.007E-01	0.0022	1.918E-02	0.0004	1.829E-01	0.0040	4.518E+01	1.0000
Total	6.895E-01	0.0153	0.000E+00	0.0000	0.000E+00	0.0000	1.007E-01	0.0022	1.918E-02	0.0004	1.829E-01	0.0040	4.518E+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+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.
Th-232	1.171E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.320E+01	0.7198	8.441E-01	0.0183	1.045E+01	0.2266	0.000E+00	0.0000
Total	1.171E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.320E+01	0.7198	8.441E-01	0.0183	1.045E+01	0.2266	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
Th-232	1.124E+00	0.0244	0.000E+00	0.0000	0.000E+00	0.0000	1.641E-01	0.0036	3.121E-02	0.0007	2.972E-01	0.0064	4.613E+01	1.0000
Total	1.124E+00	0.0244	0.000E+00	0.0000	0.000E+00	0.0000	1.641E-01	0.0036	3.121E-02	0.0007	2.972E-01	0.0064	4.613E+01	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Farmer Colonie Site Specific for Thallium with Cover
File : RESFRTLC.RAD

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.746E-02	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	3.257E+01	0.6974	8.279E-01	0.0177	1.025E+01	0.2195	0.000E+00	0.0000
Total	1.746E-02	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	3.257E+01	0.6974	8.279E-01	0.0177	1.025E+01	0.2195	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	2.110E+00	0.0452	0.000E+00	0.0000	0.000E+00	0.0000	3.081E-01	0.0066	5.852E-02	0.0013	5.567E-01	0.0119	4.670E+01	1.0000
Total	2.110E+00	0.0452	0.000E+00	0.0000	0.000E+00	0.0000	3.081E-01	0.0066	5.852E-02	0.0013	5.567E-01	0.0119	4.670E+01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	8.624E-02	0.0020	0.000E+00	0.0000	0.000E+00	0.0000	2.626E+01	0.6200	6.674E-01	0.0158	8.265E+00	0.1952	0.000E+00	0.0000
Total	8.624E-02	0.0020	0.000E+00	0.0000	0.000E+00	0.0000	2.626E+01	0.6200	6.674E-01	0.0158	8.265E+00	0.1952	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	4.922E+00	0.1162	0.000E+00	0.0000	0.000E+00	0.0000	7.186E-01	0.0170	1.363E-01	0.0032	1.296E+00	0.0306	4.235E+01	1.0000
Total	4.922E+00	0.1162	0.000E+00	0.0000	0.000E+00	0.0000	7.186E-01	0.0170	1.363E-01	0.0032	1.296E+00	0.0306	4.235E+01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	3.087E-01	0.0223	1.723E-04	0.0000	0.000E+00	0.0000	4.429E+00	0.3195	1.246E-01	0.0090	1.455E+00	0.1050	3.039E-03	0.0002
Total	3.087E-01	0.0223	1.723E-04	0.0000	0.000E+00	0.0000	4.429E+00	0.3195	1.246E-01	0.0090	1.455E+00	0.1050	3.039E-03	0.0002

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	5.250E+00	0.3787	0.000E+00	0.0000	0.000E+00	0.0000	7.665E-01	0.0553	1.454E-01	0.0105	1.382E+00	0.0996	1.386E+01	1.0000
Total	5.250E+00	0.3787	0.000E+00	0.0000	0.000E+00	0.0000	7.665E-01	0.0553	1.454E-01	0.0105	1.382E+00	0.0996	1.386E+01	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Farmer Colonie Site Specific for Thallium with Cover

File : RESFRTLC.RAD

Dose/Source Ratios Summed Over All Pathways

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent	Product	Branch	DSR(j,t) (mrem/yr)/(pCi/g)								
(i)	(j)	Fraction*	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	3.193E+01	3.197E+01	3.205E+01	3.232E+01	3.297E+01	3.346E+01	3.410E+01	3.169E+01	1.115E+01
Th-232	Ra-228	1.000E+00	0.000E+00	5.031E-01	1.007E+00	2.078E+00	2.861E+00	2.952E+00	2.963E+00	2.602E+00	8.274E-01
Th-232	Th-228	1.000E+00	0.000E+00	3.648E-01	1.477E+00	5.613E+00	9.349E+00	9.721E+00	9.641E+00	8.060E+00	1.883E+00
Th-232	∑DSR(j)		3.193E+01	3.284E+01	3.454E+01	4.001E+01	4.518E+01	4.613E+01	4.670E+01	4.235E+01	1.386E+01

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).

The DSR includes contributions from associated (half-life ≤ 0.5 yr) daughters.

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

Basic Radiation Dose Limit = 25 mrem/yr

Nuclide									
(i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	7.766E-01	7.612E-01	7.239E-01	6.248E-01	5.534E-01	5.420E-01	5.353E-01	5.903E-01	1.803E+00

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 = 103.1 ± 0.2 years

Nuclide	Initial	tmin	DSR(i,tmin)	G(i,tmin)	DSR(i,tmax)	G(i,tmax)
(i)	pCi/g	(years)		(pCi/g)		(pCi/g)
Th-232	1.000E+00	103.1 ± 0.2	4.670E+01	5.353E-01	4.670E+01	5.353E-01

Summary : Resident Farmer-Colonie Site Specific for Thallium with Cover
File : RESFRTLC.RAD

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

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr								
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	3.193E+01	3.197E+01	3.205E+01	3.232E+01	3.297E+01	3.346E+01	3.410E+01	3.169E+01	1.115E+01
Ra-228	Th-232	1.000E+00	2.029E-01	5.031E-01	1.007E+00	2.078E+00	2.861E+00	2.952E+00	2.963E+00	2.602E+00	8.274E-01
Th-228	Th-232	1.000E+00	5.741E-02	3.648E-01	1.477E+00	5.613E+00	9.349E+00	9.721E+00	9.641E+00	8.060E+00	1.883E+00

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

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g								
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	1.000E+00	9.969E-01	9.906E-01	9.691E-01	9.100E-01	8.546E-01	7.303E-01	3.894E-01	4.313E-02
Ra-228	Th-232	1.000E+00	0.000E+00	1.134E-01	3.018E-01	6.866E-01	9.046E-01	8.727E-01	7.478E-01	3.988E-01	4.417E-02
Th-228	Th-232	1.000E+00	0.000E+00	1.862E-02	1.238E-01	5.550E-01	8.977E-01	8.777E-01	7.531E-01	4.016E-01	4.448E-02

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

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RESRAD REPORT – RESIDENT FARMER COLONIE SITE SPECIFIC FOR THALLIUM WITH COVER

Part IV: Concentration of Radionuclides

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Part IV: Concentration of Radionuclides

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Concentration of radionuclides in environmental media
at t = 0.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 0.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	0.000E+00	6.453E+01	6.453E+01	6.453E+01	6.453E+01	3.498E+00	1.225E+01	0.000E+00	0.000E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	1.134E-01	0.000E+00	0.000E+00	9.694E-05	3.218E-07
Th-228	1.862E-02	0.000E+00	0.000E+00	2.168E-05	7.196E-08
Th-232	9.969E-01	0.000E+00	0.000E+00	1.677E-02	5.567E-05

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	1.018E-04	1.706E+00	1.485E+00	1.392E+00	1.465E+00	6.053E-02	9.666E-02	1.272E-03	1.963E-03
Th-228	2.157E-05	1.128E+00	1.200E+00	1.086E+00	1.200E+00	5.869E-02	2.275E-01	6.762E-04	1.015E-03
Th-232	1.672E-02	6.456E+01	6.458E+01	6.458E+01	6.459E+01	3.502E+00	1.226E+01	5.447E-01	8.171E-01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	3.018E-01	0.000E+00	0.000E+00	8.065E-04	2.677E-06
Th-228	1.238E-01	0.000E+00	0.000E+00	4.611E-04	1.531E-06
Th-232	9.906E-01	0.000E+00	0.000E+00	5.016E-02	1.665E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	8.212E-04	4.174E+00	3.954E+00	3.877E+00	3.934E+00	1.275E-01	2.529E-01	3.947E-03	6.382E-03
Th-228	4.603E-04	7.856E+00	8.056E+00	7.841E+00	8.060E+00	4.190E-01	1.528E+00	1.493E-02	2.240E-02
Th-232	5.011E-02	6.460E+01	6.466E+01	6.468E+01	6.469E+01	3.511E+00	1.228E+01	1.653E+00	2.480E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	6.866E-01	0.000E+00	0.000E+00	6.959E-03	2.310E-05
Th-228	5.550E-01	0.000E+00	0.000E+00	8.415E-03	2.794E-05
Th-232	9.691E-01	0.000E+00	0.000E+00	1.656E-01	5.497E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	7.008E-03	9.406E+00	9.193E+00	9.154E+00	9.179E+00	2.701E-01	5.849E-01	1.381E-02	2.473E-02
Th-228	8.408E-03	3.654E+01	3.702E+01	3.688E+01	3.706E+01	1.966E+00	7.026E+00	2.762E-01	4.144E-01
Th-232	1.655E-01	6.475E+01	6.492E+01	6.502E+01	6.502E+01	3.540E+00	1.237E+01	5.485E+00	8.228E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	9.046E-01	0.000E+00	0.000E+00	3.564E-02	1.183E-04
Th-228	8.977E-01	0.000E+00	0.000E+00	5.886E-02	1.954E-04
Th-232	9.100E-01	0.000E+00	0.000E+00	4.831E-01	1.604E-03

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	3.579E-02	1.313E+01	1.295E+01	1.295E+01	1.295E+01	3.742E-01	8.253E-01	4.288E-02	8.496E-02
Th-228	5.883E-02	6.322E+01	6.395E+01	6.401E+01	6.403E+01	3.414E+00	1.215E+01	1.939E+00	2.908E+00
Th-232	4.830E-01	6.496E+01	6.547E+01	6.575E+01	6.576E+01	3.612E+00	1.256E+01	1.603E+01	2.404E+01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 5.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	8.727E-01	0.000E+00	0.000E+00	6.613E-02	2.196E-04
Th-228	8.777E-01	0.000E+00	0.000E+00	1.154E-01	3.832E-04
Th-232	8.546E-01	0.000E+00	0.000E+00	7.832E-01	2.600E-03

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 5.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	6.637E-02	1.346E+01	1.331E+01	1.333E+01	1.333E+01	3.864E-01	8.512E-01	7.093E-02	1.447E-01
Th-228	1.154E-01	6.570E+01	6.650E+01	6.662E+01	6.662E+01	3.559E+00	1.265E+01	3.804E+00	5.706E+00
Th-232	7.832E-01	6.492E+01	6.575E+01	6.620E+01	6.620E+01	3.666E+00	1.270E+01	2.599E+01	3.899E+01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	7.478E-01	0.000E+00	0.000E+00	1.360E-01	4.517E-04
Th-228	7.531E-01	0.000E+00	0.000E+00	2.459E-01	8.164E-04
Th-232	7.303E-01	0.000E+00	0.000E+00	1.464E+00	4.860E-03

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	1.365E-01	1.325E+01	1.318E+01	1.325E+01	1.325E+01	3.880E-01	8.499E-01	1.346E-01	2.808E-01
Th-228	2.458E-01	6.470E+01	6.563E+01	6.583E+01	6.583E+01	3.529E+00	1.252E+01	8.107E+00	1.216E+01
Th-232	1.464E+00	6.388E+01	6.542E+01	6.627E+01	6.627E+01	3.738E+00	1.284E+01	4.859E+01	7.288E+01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	3.988E-01	0.000E+00	0.000E+00	3.351E-01	1.113E-03
Th-228	4.016E-01	0.000E+00	0.000E+00	6.186E-01	2.054E-03
Th-232	3.894E-01	0.000E+00	0.000E+00	3.403E+00	1.130E-02

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	3.362E-01	1.077E+01	1.095E+01	1.113E+01	1.113E+01	3.392E-01	7.277E-01	3.162E-01	6.686E-01
Th-228	6.183E-01	5.233E+01	5.352E+01	5.393E+01	5.393E+01	2.933E+00	1.033E+01	2.039E+01	3.059E+01
Th-232	3.403E+00	5.230E+01	5.589E+01	5.788E+01	5.788E+01	3.478E+00	1.160E+01	1.130E+02	1.695E+02

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+03 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	4.417E-02	4.417E-02	2.026E-08	3.675E-01	1.220E-03
Th-228	4.448E-02	4.448E-02	2.041E-08	6.844E-01	2.272E-03
Th-232	4.313E-02	4.313E-02	1.979E-08	3.627E+00	1.204E-02

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+03 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	3.686E-01	1.926E+00	2.286E+00	2.497E+00	2.497E+00	1.158E-01	2.033E-01	3.388E-01	7.212E-01
Th-228	6.841E-01	9.040E+00	9.853E+00	1.026E+01	1.026E+01	6.582E-01	2.135E+00	2.257E+01	3.385E+01
Th-232	3.627E+00	9.915E+00	1.374E+01	1.586E+01	1.586E+01	1.266E+00	3.727E+00	1.204E+02	1.807E+02

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

RESRAD REPORT – RESIDENT COLONIE SITE SPECIFIC FOR THALLIUM WITH COVER

Part I: Mixture Sums and Single Radionuclide Guidelines

Summary : Resident Colonie Site Specific for Thallium with Cover

File : RESTLCOV.RAD

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Dose Conversion Factor (and Related) Parameter Summary

File: 02874392.LI3

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B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ra-228+D	5.080E-03	5.080E-03	DCF2(1)
B-1	Th-228+D	3.450E-01	3.450E-01	DCF2(2)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(3)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ra-228+D	1.440E-03	1.440E-03	DCF3(1)
D-1	Th-228+D	8.080E-04	8.080E-04	DCF3(2)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(3)
D-34	Food transfer factors:			
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	2.000E-01	1.000E-03	RTF(2,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-03	1.000E-04	RTF(2,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-03	5.000E-06	RTF(2,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	2.000E-01	1.000E-03	RTF(3,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-03	1.000E-04	RTF(3,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-03	5.000E-06	RTF(3,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(1,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(1,2)
D-5				
D-5	Th-228+D , fish	1.000E+04	1.000E+02	BIOFAC(2,1)
D-5	Th-228+D , crustacea and mollusks	1.500E+04	5.000E+02	BIOFAC(2,2)
D-5				
D-5	Th-232 , fish	1.000E+04	1.000E+02	BIOFAC(3,1)
D-5	Th-232 , crustacea and mollusks	1.500E+04	5.000E+02	BIOFAC(3,2)

Summary : Resident Colonie Site Specific for Thallium with Cover

File : RESTLCOV.RAD

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.400E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.000E+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)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	5.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Th-232	1.000E+00	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(3)
R013	Cover depth (m)	6.096E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.431E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.150E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	3.500E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.990E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.830E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	3.120E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	3.500E+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)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS

Summary : Resident Colonie Site Specific for Thallium with Cover

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	5.000E+01	6.000E+04	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	5.000E+01	6.000E+04	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.144E-03	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.151E-04	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)	2.700E+02	6.000E+04	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	2.700E+02	6.000E+04	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.835E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.571E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.101E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.120E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.140E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	0.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	2.500E-01	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	2.500E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	1.230E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	0.000E+00	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS

Summary : Resident Colonie Site Specific for Thallium with Cover

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	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	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

Summary : Resident Colonie Site Specific for Thallium with Cover

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Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	2400.00 square meters	Th-232	1.000E+00
Thickness:	2.00 meters		
Cover Depth:	0.61 meters		

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 25 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	5.932E+00	6.057E+00	6.377E+00	7.386E+00	8.248E+00	8.313E+00	8.160E+00	6.650E+00	1.419E+00
M(t):	2.373E-01	2.423E-01	2.551E-01	2.954E-01	3.299E-01	3.325E-01	3.264E-01	2.660E-01	5.677E-02

Maximum TDOSE(t): 8.314E+00 mrem/yr at t = 47.06 ± 0.09 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 = 4.706E+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.
Th-232	1.142E-02	0.0014	0.000E+00	0.0000	0.000E+00	0.0000	8.302E+00	0.9986	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.142E-02	0.0014	0.000E+00	0.0000	0.000E+00	0.0000	8.302E+00	0.9986	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 4.706E+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.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.314E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.314E+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.
Th-232	1.127E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.932E+00	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.127E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.932E+00	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.932E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.932E+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.
Th-232	4.629E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	6.057E+00	0.9999	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	4.629E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	6.057E+00	0.9999	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.057E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.057E+00	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Colonie Site Specific for Thallium with Cover

File : RESTLCOV.RAD

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.483E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	6.376E+00	0.9998	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.483E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	6.376E+00	0.9998	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.377E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.377E+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.
Th-232	5.140E-03	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	7.381E+00	0.9993	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.140E-03	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	7.381E+00	0.9993	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.386E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.386E+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.
Th-232	9.642E-03	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	8.239E+00	0.9988	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	9.642E-03	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	8.239E+00	0.9988	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.248E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.248E+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+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.
Th-232	1.171E-02	0.0014	0.000E+00	0.0000	0.000E+00	0.0000	8.301E+00	0.9986	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.171E-02	0.0014	0.000E+00	0.0000	0.000E+00	0.0000	8.301E+00	0.9986	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.313E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.313E+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+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.746E-02	0.0021	0.000E+00	0.0000	0.000E+00	0.0000	8.143E+00	0.9979	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.746E-02	0.0021	0.000E+00	0.0000	0.000E+00	0.0000	8.143E+00	0.9979	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.160E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.160E+00	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Colonie Site Specific for Thallium with Cover

File : RESTLCOV.RAD

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	8.624E-02	0.0130	0.000E+00	0.0000	0.000E+00	0.0000	6.564E+00	0.9870	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	8.624E-02	0.0130	0.000E+00	0.0000	0.000E+00	0.0000	6.564E+00	0.9870	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.650E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.650E+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+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	3.087E-01	0.2175	1.723E-04	0.0001	0.000E+00	0.0000	1.107E+00	0.7802	0.000E+00	0.0000	0.000E+00	0.0000	3.039E-03	0.0021
Total	3.087E-01	0.2175	1.723E-04	0.0001	0.000E+00	0.0000	1.107E+00	0.7802	0.000E+00	0.0000	0.000E+00	0.0000	3.039E-03	0.0021

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.419E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.419E+00	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Colonie Site Specific for Thallium with Cover

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Dose/Source Ratios Summed Over All Pathways

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	5.876E+00	5.878E+00	5.881E+00	5.890E+00	5.899E+00	5.885E+00	5.767E+00	4.649E+00	7.860E-01
Th-232	Ra-228	1.000E+00	0.000E+00	1.124E-01	2.245E-01	4.620E-01	6.310E-01	6.457E-01	6.357E-01	5.311E-01	2.002E-01
Th-232	Th-228	1.000E+00	0.000E+00	6.683E-02	2.716E-01	1.033E+00	1.718E+00	1.782E+00	1.758E+00	1.471E+00	4.330E-01
Th-232	∑DSR(j)		5.876E+00	6.057E+00	6.377E+00	7.386E+00	8.248E+00	8.313E+00	8.160E+00	6.650E+00	1.419E+00

*Branch Fraction is the cumulative factor for the j'th principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).

The DSR includes contributions from associated (half-life ≤ 0.5 yr) daughters.

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

Basic Radiation Dose Limit = 25 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	4.214E+00	4.127E+00	3.920E+00	3.385E+00	3.031E+00	3.007E+00	3.064E+00	3.759E+00	1.761E+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 = 47.06 ± 0.09 years

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Th-232	1.000E+00	47.06 ± 0.09	8.314E+00	3.007E+00	8.314E+00	3.007E+00

Summary : Resident Colonie Site Specific for Thallium with Cover

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Individual Nuclide Dose Summed Over All Pathways

Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr								
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	5.876E+00	5.878E+00	5.881E+00	5.890E+00	5.899E+00	5.885E+00	5.767E+00	4.649E+00	7.860E-01
Ra-228	Th-232	1.000E+00	4.533E-02	1.124E-01	2.245E-01	4.620E-01	6.310E-01	6.457E-01	6.357E-01	5.311E-01	2.002E-01
Th-228	Th-232	1.000E+00	1.042E-02	6.683E-02	2.716E-01	1.033E+00	1.718E+00	1.782E+00	1.758E+00	1.471E+00	4.330E-01

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

Individual Nuclide Soil Concentration

Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g								
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	1.000E+00	9.969E-01	9.906E-01	9.691E-01	9.100E-01	8.546E-01	7.303E-01	3.894E-01	4.313E-02
Ra-228	Th-232	1.000E+00	0.000E+00	1.134E-01	3.018E-01	6.866E-01	9.046E-01	8.727E-01	7.478E-01	3.988E-01	4.417E-02
Th-228	Th-232	1.000E+00	0.000E+00	1.862E-02	1.238E-01	5.550E-01	8.977E-01	8.777E-01	7.531E-01	4.016E-01	4.448E-02

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

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RESRAD REPORT – RESIDENT COLONIE SITE SPECIFIC FOR THALLIUM WITH COVER

Part IV: Concentration of Radionuclides

Concent : Resident Colonie Site Specific for Thallium with Cover
File : RESTLCOV.RAD

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Part IV: Concentration of Radionuclides

Concentration of radionuclides in different media

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Time= 5.000E+01 7
Time= 1.000E+02 8
Time= 3.000E+02 9
Time= 1.000E+03 10

Concentration of radionuclides in environmental media
at t = 0.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 0.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	0.000E+00	6.453E+01	6.453E+01	6.453E+01	6.453E+01	3.498E+00	1.225E+01	0.000E+00	0.000E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	1.134E-01	0.000E+00	0.000E+00	9.694E-05	3.218E-07
Th-228	1.862E-02	0.000E+00	0.000E+00	2.168E-05	7.196E-08
Th-232	9.969E-01	0.000E+00	0.000E+00	1.677E-02	5.567E-05

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	1.018E-04	1.706E+00	1.485E+00	1.392E+00	1.464E+00	6.051E-02	9.664E-02	1.272E-03	1.963E-03
Th-228	2.157E-05	1.128E+00	1.200E+00	1.086E+00	1.200E+00	5.869E-02	2.275E-01	6.762E-04	1.015E-03
Th-232	1.672E-02	6.455E+01	6.455E+01	6.455E+01	6.455E+01	3.500E+00	1.225E+01	5.447E-01	8.171E-01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	3.018E-01	0.000E+00	0.000E+00	8.065E-04	2.677E-06
Th-228	1.238E-01	0.000E+00	0.000E+00	4.611E-04	1.531E-06
Th-232	9.906E-01	0.000E+00	0.000E+00	5.016E-02	1.665E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	8.212E-04	4.173E+00	3.953E+00	3.876E+00	3.933E+00	1.274E-01	2.528E-01	3.947E-03	6.382E-03
Th-228	4.603E-04	7.856E+00	8.055E+00	7.840E+00	8.059E+00	4.189E-01	1.528E+00	1.493E-02	2.240E-02
Th-232	5.011E-02	6.459E+01	6.459E+01	6.459E+01	6.459E+01	3.506E+00	1.226E+01	1.653E+00	2.480E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	6.866E-01	0.000E+00	0.000E+00	6.959E-03	2.310E-05
Th-228	5.550E-01	0.000E+00	0.000E+00	8.415E-03	2.794E-05
Th-232	9.691E-01	0.000E+00	0.000E+00	1.656E-01	5.497E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	7.008E-03	9.404E+00	9.183E+00	9.140E+00	9.165E+00	2.696E-01	5.840E-01	1.381E-02	2.473E-02
Th-228	8.408E-03	3.654E+01	3.701E+01	3.687E+01	3.704E+01	1.965E+00	7.023E+00	2.762E-01	4.144E-01
Th-232	1.655E-01	6.469E+01	6.469E+01	6.469E+01	6.469E+01	3.523E+00	1.230E+01	5.485E+00	8.228E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	9.046E-01	0.000E+00	0.000E+00	3.564E-02	1.183E-04
Th-228	8.977E-01	0.000E+00	0.000E+00	5.886E-02	1.954E-04
Th-232	9.100E-01	0.000E+00	0.000E+00	4.831E-01	1.604E-03

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	3.579E-02	1.312E+01	1.290E+01	1.288E+01	1.288E+01	3.719E-01	8.207E-01	4.288E-02	8.496E-02
Th-228	5.883E-02	6.320E+01	6.386E+01	6.390E+01	6.391E+01	3.408E+00	1.213E+01	1.939E+00	2.908E+00
Th-232	4.830E-01	6.479E+01	6.479E+01	6.479E+01	6.479E+01	3.560E+00	1.238E+01	1.603E+01	2.404E+01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 5.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	8.727E-01	0.000E+00	0.000E+00	6.613E-02	2.196E-04
Th-228	8.777E-01	0.000E+00	0.000E+00	1.154E-01	3.832E-04
Th-232	8.546E-01	0.000E+00	0.000E+00	7.832E-01	2.600E-03

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 5.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	6.637E-02	1.344E+01	1.322E+01	1.320E+01	1.320E+01	3.823E-01	8.428E-01	7.093E-02	1.447E-01
Th-228	1.154E-01	6.566E+01	6.634E+01	6.639E+01	6.639E+01	3.546E+00	1.261E+01	3.804E+00	5.706E+00
Th-232	7.832E-01	6.464E+01	6.464E+01	6.464E+01	6.464E+01	3.582E+00	1.241E+01	2.599E+01	3.899E+01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	7.478E-01	0.000E+00	0.000E+00	1.360E-01	4.517E-04
Th-228	7.531E-01	0.000E+00	0.000E+00	2.459E-01	8.164E-04
Th-232	7.303E-01	0.000E+00	0.000E+00	1.464E+00	4.860E-03

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	1.365E-01	1.321E+01	1.299E+01	1.298E+01	1.298E+01	3.797E-01	8.326E-01	1.346E-01	2.808E-01
Th-228	2.458E-01	6.462E+01	6.529E+01	6.534E+01	6.534E+01	3.503E+00	1.243E+01	8.107E+00	1.216E+01
Th-232	1.464E+00	6.336E+01	6.335E+01	6.336E+01	6.335E+01	3.580E+00	1.228E+01	4.859E+01	7.288E+01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	3.988E-01	0.000E+00	0.000E+00	3.351E-01	1.113E-03
Th-228	4.016E-01	0.000E+00	0.000E+00	6.186E-01	2.054E-03
Th-232	3.894E-01	0.000E+00	0.000E+00	3.403E+00	1.130E-02

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	3.362E-01	1.065E+01	1.048E+01	1.047E+01	1.046E+01	3.189E-01	6.852E-01	3.162E-01	6.686E-01
Th-228	6.183E-01	5.212E+01	5.265E+01	5.270E+01	5.269E+01	2.867E+00	1.010E+01	2.039E+01	3.059E+01
Th-232	3.403E+00	5.110E+01	5.109E+01	5.110E+01	5.109E+01	3.110E+00	1.031E+01	1.130E+02	1.695E+02

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+03 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	4.417E-02	4.417E-02	2.026E-08	3.675E-01	1.220E-03
Th-228	4.448E-02	4.448E-02	2.041E-08	6.844E-01	2.272E-03
Th-232	4.313E-02	4.313E-02	1.979E-08	3.627E+00	1.204E-02

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+03 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	3.686E-01	1.798E+00	1.769E+00	1.767E+00	1.767E+00	9.357E-02	1.567E-01	3.388E-01	7.212E-01
Th-228	6.841E-01	8.799E+00	8.889E+00	8.898E+00	8.896E+00	5.853E-01	1.876E+00	2.257E+01	3.385E+01
Th-232	3.627E+00	8.627E+00	8.626E+00	8.628E+00	8.626E+00	8.736E-01	2.354E+00	1.204E+02	1.807E+02

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

RESRAD REPORT – INDUSTRIAL COLONIE SITE SPECIFIC FOR THALLIUM WITH COVER

Part I: Mixture Sums and Single Radionuclide Guidelines

Summary : Industrial Colonie Site Specific for Thallium with Cover

File : INDTLCOV.RAD

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Dose Conversion Factor (and Related) Parameter Summary

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Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ra-228+D	5.080E-03	5.080E-03	DCF2(1)
B-1	Th-228+D	3.450E-01	3.450E-01	DCF2(2)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(3)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ra-228+D	1.440E-03	1.440E-03	DCF3(1)
D-1	Th-228+D	8.080E-04	8.080E-04	DCF3(2)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(3)
D-34	Food transfer factors:			
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	2.000E-01	1.000E-03	RTF(2,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-03	1.000E-04	RTF(2,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-03	5.000E-06	RTF(2,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	2.000E-01	1.000E-03	RTF(3,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-03	1.000E-04	RTF(3,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-03	5.000E-06	RTF(3,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(1,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(1,2)
D-5				
D-5	Th-228+D , fish	1.000E+04	1.000E+02	BIOFAC(2,1)
D-5	Th-228+D , crustacea and mollusks	1.500E+04	5.000E+02	BIOFAC(2,2)
D-5				
D-5	Th-232 , fish	1.000E+04	1.000E+02	BIOFAC(3,1)
D-5	Th-232 , crustacea and mollusks	1.500E+04	5.000E+02	BIOFAC(3,2)

Summary : Industrial Colonie Site Specific for Thallium with Cover

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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)	2.400E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	5.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Th-232	1.000E+00	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(3)
R013	Cover depth (m)	6.096E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.431E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.150E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	3.500E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.990E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.830E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Summary : Industrial Colonie Site Specific for Thallium with Cover

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	5.000E+01	6.000E+04	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.144E-03	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.151E-04	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)	2.700E+02	6.000E+04	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.835E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	1.426E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.426E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	0.000E+00	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	513	---	---	KYMAX

Summary of Pathway Selections

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

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Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	2400.00 square meters	Th-232	1.000E+00
Thickness:	2.00 meters		
Cover Depth:	0.61 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 25 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	5.280E-05	2.168E-04	6.946E-04	2.407E-03	4.516E-03	5.482E-03	8.175E-03	4.039E-02	1.458E-01
M(t):	2.112E-06	8.672E-06	2.778E-05	9.629E-05	1.806E-04	2.193E-04	3.270E-04	1.616E-03	5.833E-03

Maximum TDOSE(t): 5.032E-01 mrem/yr at t = 608 ± 1 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 = 6.081E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	4.991E-01	0.9917	3.142E-04	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.847E-03	0.0076
Total	4.991E-01	0.9917	3.142E-04	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.847E-03	0.0076

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 6.081E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.032E-01	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.032E-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 = 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.
Th-232	5.280E-05	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.280E-05	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.280E-05	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.280E-05	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	2.168E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.168E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 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.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.168E-04	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.168E-04	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 = 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	6.946E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	6.946E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.946E-04	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.946E-04	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+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.
Th-232	2.407E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.407E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 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.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.407E-03	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.407E-03	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 = 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.
Th-232	4.516E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	4.516E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 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.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.516E-03	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.516E-03	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
Th-232	5.482E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.482E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.482E-03	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.482E-03	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	8.175E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	8.175E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.175E-03	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.175E-03	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	4.039E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	4.039E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.039E-02	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.039E-02	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.446E-01	0.9916	9.226E-05	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.130E-03	0.0077
Total	1.446E-01	0.9916	9.226E-05	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.130E-03	0.0077

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.458E-01	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.458E-01	1.0000

*Sum of all water independent and dependent pathways.

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Dose/Source Ratios Summed Over All Pathways

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	1.254E-12	1.288E-12	1.359E-12	1.637E-12	2.788E-12	4.748E-12	1.797E-11	3.689E-09	6.925E-04
Th-232	Ra-228	1.000E+00	0.000E+00	9.533E-05	2.030E-04	4.560E-04	7.551E-04	9.356E-04	1.505E-03	9.958E-03	5.341E-02
Th-232	Th-228	1.000E+00	0.000E+00	1.215E-04	4.916E-04	1.951E-03	3.761E-03	4.547E-03	6.671E-03	3.043E-02	9.171E-02
Th-232	∑DSR(j)		1.254E-12	2.168E-04	6.946E-04	2.407E-03	4.516E-03	5.482E-03	8.175E-03	4.039E-02	1.458E-01

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).

The DSR includes contributions from associated (half-life ≤ 0.5 yr) daughters.

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

Basic Radiation Dose Limit = 25 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	*1.096E+05	*1.096E+05	3.599E+04	1.039E+04	5.536E+03	4.560E+03	3.058E+03	6.190E+02	1.715E+02

*At specific activity limit

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

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

at tmin = time of minimum single radionuclide soil guideline

and at tmax = time of maximum total dose = 608 ± 1 years

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Th-232	1.000E+00	608 ± 1	5.032E-01	4.968E+01	5.032E-01	4.968E+01

Summary : Industrial Colonie Site Specific for Thallium with Cover

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Individual Nuclide Dose Summed Over All Pathways

Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr								
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	1.254E-12	1.288E-12	1.359E-12	1.637E-12	2.788E-12	4.748E-12	1.797E-11	3.689E-09	6.925E-04
Ra-228	Th-232	1.000E+00	3.316E-05	9.533E-05	2.030E-04	4.560E-04	7.551E-04	9.356E-04	1.505E-03	9.958E-03	5.341E-02
Th-228	Th-232	1.000E+00	1.964E-05	1.215E-04	4.916E-04	1.951E-03	3.761E-03	4.547E-03	6.671E-03	3.043E-02	9.171E-02

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

Individual Nuclide Soil Concentration

Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g								
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	1.000E+00	9.969E-01	9.906E-01	9.691E-01	9.100E-01	8.546E-01	7.303E-01	3.894E-01	4.313E-02
Ra-228	Th-232	1.000E+00	0.000E+00	1.134E-01	3.018E-01	6.866E-01	9.046E-01	8.727E-01	7.478E-01	3.988E-01	4.417E-02
Th-228	Th-232	1.000E+00	0.000E+00	1.862E-02	1.238E-01	5.550E-01	8.977E-01	8.777E-01	7.531E-01	4.016E-01	4.448E-02

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

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RESRAD REPORT – INDUSTRIAL COLONIE SITE SPECIFIC FOR THALLIUM WITH COVER

Part IV: Concentration of Radionuclides

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Part IV: Concentration of Radionuclides

Concentration of radionuclides in different media
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Concentration of radionuclides in environmental media
at t = 0.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 0.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	0.000E+00	6.453E+01	6.453E+01	6.453E+01	6.453E+01	3.498E+00	1.225E+01	0.000E+00	0.000E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	1.134E-01	0.000E+00	0.000E+00	9.694E-05	3.218E-07
Th-228	1.862E-02	0.000E+00	0.000E+00	2.168E-05	7.196E-08
Th-232	9.969E-01	0.000E+00	0.000E+00	1.677E-02	5.567E-05

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	1.018E-04	1.706E+00	1.485E+00	1.392E+00	1.465E+00	6.053E-02	9.666E-02	1.272E-03	1.963E-03
Th-228	2.157E-05	1.128E+00	1.200E+00	1.086E+00	1.200E+00	5.869E-02	2.275E-01	6.762E-04	1.015E-03
Th-232	1.672E-02	6.456E+01	6.458E+01	6.458E+01	6.459E+01	3.502E+00	1.226E+01	5.447E-01	8.171E-01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	3.018E-01	0.000E+00	0.000E+00	8.065E-04	2.677E-06
Th-228	1.238E-01	0.000E+00	0.000E+00	4.611E-04	1.531E-06
Th-232	9.906E-01	0.000E+00	0.000E+00	5.016E-02	1.665E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	8.212E-04	4.174E+00	3.954E+00	3.877E+00	3.934E+00	1.275E-01	2.529E-01	3.947E-03	6.382E-03
Th-228	4.603E-04	7.856E+00	8.056E+00	7.841E+00	8.060E+00	4.190E-01	1.528E+00	1.493E-02	2.240E-02
Th-232	5.011E-02	6.460E+01	6.466E+01	6.468E+01	6.469E+01	3.511E+00	1.228E+01	1.653E+00	2.480E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	6.866E-01	0.000E+00	0.000E+00	6.959E-03	2.310E-05
Th-228	5.550E-01	0.000E+00	0.000E+00	8.415E-03	2.794E-05
Th-232	9.691E-01	0.000E+00	0.000E+00	1.656E-01	5.497E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	7.008E-03	9.406E+00	9.193E+00	9.154E+00	9.179E+00	2.701E-01	5.849E-01	1.381E-02	2.473E-02
Th-228	8.408E-03	3.654E+01	3.702E+01	3.688E+01	3.706E+01	1.966E+00	7.026E+00	2.762E-01	4.144E-01
Th-232	1.655E-01	6.475E+01	6.492E+01	6.502E+01	6.502E+01	3.540E+00	1.237E+01	5.485E+00	8.228E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	9.046E-01	0.000E+00	0.000E+00	3.564E-02	1.183E-04
Th-228	8.977E-01	0.000E+00	0.000E+00	5.886E-02	1.954E-04
Th-232	9.100E-01	0.000E+00	0.000E+00	4.831E-01	1.604E-03

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	3.579E-02	1.313E+01	1.295E+01	1.295E+01	1.295E+01	3.742E-01	8.253E-01	4.288E-02	8.496E-02
Th-228	5.883E-02	6.322E+01	6.395E+01	6.401E+01	6.403E+01	3.414E+00	1.215E+01	1.939E+00	2.908E+00
Th-232	4.830E-01	6.496E+01	6.547E+01	6.575E+01	6.576E+01	3.612E+00	1.256E+01	1.603E+01	2.404E+01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 5.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	8.727E-01	0.000E+00	0.000E+00	6.613E-02	2.196E-04
Th-228	8.777E-01	0.000E+00	0.000E+00	1.154E-01	3.832E-04
Th-232	8.546E-01	0.000E+00	0.000E+00	7.832E-01	2.600E-03

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 5.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	6.637E-02	1.346E+01	1.331E+01	1.333E+01	1.333E+01	3.864E-01	8.512E-01	7.093E-02	1.447E-01
Th-228	1.154E-01	6.570E+01	6.650E+01	6.662E+01	6.662E+01	3.559E+00	1.265E+01	3.804E+00	5.706E+00
Th-232	7.832E-01	6.492E+01	6.575E+01	6.620E+01	6.620E+01	3.666E+00	1.270E+01	2.599E+01	3.899E+01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	7.478E-01	0.000E+00	0.000E+00	1.360E-01	4.517E-04
Th-228	7.531E-01	0.000E+00	0.000E+00	2.459E-01	8.164E-04
Th-232	7.303E-01	0.000E+00	0.000E+00	1.464E+00	4.860E-03

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	1.365E-01	1.325E+01	1.318E+01	1.325E+01	1.325E+01	3.880E-01	8.499E-01	1.346E-01	2.808E-01
Th-228	2.458E-01	6.470E+01	6.563E+01	6.583E+01	6.583E+01	3.529E+00	1.252E+01	8.107E+00	1.216E+01
Th-232	1.464E+00	6.388E+01	6.542E+01	6.627E+01	6.627E+01	3.738E+00	1.284E+01	4.859E+01	7.288E+01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	3.988E-01	0.000E+00	0.000E+00	3.351E-01	1.113E-03
Th-228	4.016E-01	0.000E+00	0.000E+00	6.186E-01	2.054E-03
Th-232	3.894E-01	0.000E+00	0.000E+00	3.403E+00	1.130E-02

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	3.362E-01	1.077E+01	1.095E+01	1.113E+01	1.113E+01	3.392E-01	7.277E-01	3.162E-01	6.686E-01
Th-228	6.183E-01	5.233E+01	5.352E+01	5.393E+01	5.393E+01	2.933E+00	1.033E+01	2.039E+01	3.059E+01
Th-232	3.403E+00	5.230E+01	5.589E+01	5.788E+01	5.788E+01	3.478E+00	1.160E+01	1.130E+02	1.695E+02

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+03 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	4.417E-02	4.417E-02	2.026E-08	3.675E-01	1.220E-03
Th-228	4.448E-02	4.448E-02	2.041E-08	6.844E-01	2.272E-03
Th-232	4.313E-02	4.313E-02	1.979E-08	3.627E+00	1.204E-02

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+03 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	3.686E-01	1.926E+00	2.286E+00	2.497E+00	2.497E+00	1.158E-01	2.033E-01	3.388E-01	7.212E-01
Th-228	6.841E-01	9.040E+00	9.853E+00	1.026E+01	1.026E+01	6.582E-01	2.135E+00	2.257E+01	3.385E+01
Th-232	3.627E+00	9.915E+00	1.374E+01	1.586E+01	1.586E+01	1.266E+00	3.727E+00	1.204E+02	1.807E+02

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

RESRAD REPORT – RESIDENT FARMER COLONIE SITE SPECIFIC FOR CADMIUM WITH COVER

Part I: Mixture Sums and Single Radionuclide Guidelines

Summary : Resident Farmer Colonie Site Specific for Cadium with Cover
File : RESFRCDC.RAD

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Summary : Resident Farmer Colonie Site Specific for Cadium with Cover

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Dose Conversion Factor (and Related) Parameter Summary

File: 46300905.LIB

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ra-228+D	5.080E-03	5.080E-03	DCF2(1)
B-1	Th-228+D	3.450E-01	3.450E-01	DCF2(2)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(3)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ra-228+D	1.440E-03	1.440E-03	DCF3(1)
D-1	Th-228+D	8.080E-04	8.080E-04	DCF3(2)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(3)
D-34	Food transfer factors:			
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	3.000E-01	1.000E-03	RTF(2,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	4.000E-04	1.000E-04	RTF(2,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	5.000E-06	RTF(2,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	3.000E-01	1.000E-03	RTF(3,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	4.000E-04	1.000E-04	RTF(3,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	5.000E-06	RTF(3,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(1,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(1,2)
D-5				
D-5	Th-228+D , fish	2.000E+02	1.000E+02	BIOFAC(2,1)
D-5	Th-228+D , crustacea and mollusks	2.000E+03	5.000E+02	BIOFAC(2,2)
D-5				
D-5	Th-232 , fish	2.000E+02	1.000E+02	BIOFAC(3,1)
D-5	Th-232 , crustacea and mollusks	2.000E+03	5.000E+02	BIOFAC(3,2)

Summary : Resident Farmer Colonie Site Specific for Cadium with Cover

File : RESFRCDC.RAD

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.400E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.000E+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)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	5.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Th-232	1.000E+00	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(3)
R013	Cover depth (m)	6.096E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.431E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.150E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	3.500E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.990E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.830E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	3.120E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	3.500E+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)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS

Summary : Resident Farmer Colonie Site Specific for Cadium with Cover
File : RESFRCDC.RAD

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	1.300E+02	6.000E+04	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	1.300E+02	6.000E+04	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.211E-03	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.151E-04	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)	2.700E+02	6.000E+04	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	2.700E+02	6.000E+04	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.835E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.571E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.101E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.120E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.140E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	2.330E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.510E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	4.785E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	1.000E+00	-1	---	FPLANT
R018	Contamination fraction of meat	1.000E+00	-1	---	FMEAT
R018	Contamination fraction of milk	1.000E+00	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	2.710E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	6.325E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	6.000E+01	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	2.500E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	1.230E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	1.500E-01	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	0.000E+00	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	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	active
5 -- milk ingestion	active
6 -- aquatic foods	suppressed
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

Summary : Resident Farmer Colonie Site Specific for Cadium with Cover

File : RESFRCDC.RAD

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	2400.00 square meters	Th-232	1.000E+00
Thickness:	2.00 meters		
Cover Depth:	0.61 meters		

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 25 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	3.967E+01	4.044E+01	4.250E+01	4.936E+01	5.691E+01	5.962E+01	6.459E+01	7.740E+01	5.478E+01
M(t):	1.587E+00	1.618E+00	1.700E+00	1.974E+00	2.276E+00	2.385E+00	2.584E+00	3.096E+00	2.191E+00

Maximum TDOSE(t): 8.549E+01 mrem/yr at t = 608 ± 1 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 = 6.080E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	3.387E+00	0.0396	1.894E-03	0.0000	0.000E+00	0.0000	7.146E+01	0.8359	4.517E-01	0.0053	8.177E+00	0.0957	3.324E-02	0.0004
Total	3.387E+00	0.0396	1.894E-03	0.0000	0.000E+00	0.0000	7.146E+01	0.8359	4.517E-01	0.0053	8.177E+00	0.0957	3.324E-02	0.0004

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

As mrem/yr and Fraction of Total Dose At t = 6.080E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.589E+00	0.0186	0.000E+00	0.0000	0.000E+00	0.0000	2.368E-01	0.0028	1.045E-02	0.0001	1.443E-01	0.0017	8.549E+01	1.0000
Total	1.589E+00	0.0186	0.000E+00	0.0000	0.000E+00	0.0000	2.368E-01	0.0028	1.045E-02	0.0001	1.443E-01	0.0017	8.549E+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.
Th-232	1.128E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.556E+01	0.8963	1.893E-01	0.0048	3.923E+00	0.0989	0.000E+00	0.0000
Total	1.128E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.556E+01	0.8963	1.893E-01	0.0048	3.923E+00	0.0989	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.319E-03	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.855E-04	0.0000	6.457E-06	0.0000	1.190E-04	0.0000	3.967E+01	1.0000
Total	1.319E-03	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.855E-04	0.0000	6.457E-06	0.0000	1.190E-04	0.0000	3.967E+01	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Farmer Colonie Site Specific for Cadium with Cover
File : RESFRCDC.RAD

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	4.635E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.624E+01	0.8962	1.950E-01	0.0048	3.999E+00	0.0989	0.000E+00	0.0000
Total	4.635E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.624E+01	0.8962	1.950E-01	0.0048	3.999E+00	0.0989	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	4.008E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	5.888E-04	0.0000	2.202E-05	0.0000	3.635E-04	0.0000	4.044E+01	1.0000
Total	4.008E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	5.888E-04	0.0000	2.202E-05	0.0000	3.635E-04	0.0000	4.044E+01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.487E-03	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.807E+01	0.8959	2.083E-01	0.0049	4.204E+00	0.0989	0.000E+00	0.0000
Total	1.487E-03	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.807E+01	0.8959	2.083E-01	0.0049	4.204E+00	0.0989	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	9.549E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	1.419E-03	0.0000	5.505E-05	0.0000	8.672E-04	0.0000	4.250E+01	1.0000
Total	9.549E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	1.419E-03	0.0000	5.505E-05	0.0000	8.672E-04	0.0000	4.250E+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.
Th-232	5.192E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	4.418E+01	0.8952	2.482E-01	0.0050	4.883E+00	0.0989	0.000E+00	0.0000
Total	5.192E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	4.418E+01	0.8952	2.482E-01	0.0050	4.883E+00	0.0989	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	3.044E-02	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	4.541E-03	0.0001	1.855E-04	0.0000	2.765E-03	0.0001	4.936E+01	1.0000
Total	3.044E-02	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	4.541E-03	0.0001	1.855E-04	0.0000	2.765E-03	0.0001	4.936E+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.
Th-232	1.004E-02	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	5.086E+01	0.8938	2.896E-01	0.0051	5.624E+00	0.0988	0.000E+00	0.0000
Total	1.004E-02	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	5.086E+01	0.8938	2.896E-01	0.0051	5.624E+00	0.0988	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	9.509E-02	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	1.418E-02	0.0002	6.067E-04	0.0000	8.639E-03	0.0002	5.691E+01	1.0000
Total	9.509E-02	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	1.418E-02	0.0002	6.067E-04	0.0000	8.639E-03	0.0002	5.691E+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+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.
Th-232	1.264E-02	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	5.322E+01	0.8926	3.033E-01	0.0051	5.884E+00	0.0987	0.000E+00	0.0000
Total	1.264E-02	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	5.322E+01	0.8926	3.033E-01	0.0051	5.884E+00	0.0987	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
Th-232	1.603E-01	0.0027	0.000E+00	0.0000	0.000E+00	0.0000	2.390E-02	0.0004	1.036E-03	0.0000	1.456E-02	0.0002	5.962E+01	1.0000
Total	1.603E-01	0.0027	0.000E+00	0.0000	0.000E+00	0.0000	2.390E-02	0.0004	1.036E-03	0.0000	1.456E-02	0.0002	5.962E+01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	2.076E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	5.749E+01	0.8900	3.276E-01	0.0051	6.356E+00	0.0984	0.000E+00	0.0000
Total	2.076E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	5.749E+01	0.8900	3.276E-01	0.0051	6.356E+00	0.0984	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	3.189E-01	0.0049	0.000E+00	0.0000	0.000E+00	0.0000	4.753E-02	0.0007	2.082E-03	0.0000	2.897E-02	0.0004	6.459E+01	1.0000
Total	3.189E-01	0.0049	0.000E+00	0.0000	0.000E+00	0.0000	4.753E-02	0.0007	2.082E-03	0.0000	2.897E-02	0.0004	6.459E+01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.510E-01	0.0020	0.000E+00	0.0000	0.000E+00	0.0000	6.821E+01	0.8813	3.887E-01	0.0050	7.542E+00	0.0974	0.000E+00	0.0000
Total	1.510E-01	0.0020	0.000E+00	0.0000	0.000E+00	0.0000	6.821E+01	0.8813	3.887E-01	0.0050	7.542E+00	0.0974	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	8.879E-01	0.0115	0.000E+00	0.0000	0.000E+00	0.0000	1.323E-01	0.0017	5.834E-03	0.0001	8.066E-02	0.0010	7.740E+01	1.0000
Total	8.879E-01	0.0115	0.000E+00	0.0000	0.000E+00	0.0000	1.323E-01	0.0017	5.834E-03	0.0001	8.066E-02	0.0010	7.740E+01	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Farmer Colonie Site Specific for Cadium with Cover

File : RESFRCDC.RAD

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	2.093E+00	0.0382	1.187E-03	0.0000	0.000E+00	0.0000	4.450E+01	0.8123	2.815E-01	0.0051	5.094E+00	0.0930	2.084E-02	0.0004
Total	2.093E+00	0.0382	1.187E-03	0.0000	0.000E+00	0.0000	4.450E+01	0.8123	2.815E-01	0.0051	5.094E+00	0.0930	2.084E-02	0.0004

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	2.239E+00	0.0409	0.000E+00	0.0000	0.000E+00	0.0000	3.338E-01	0.0061	1.474E-02	0.0003	2.034E-01	0.0037	5.478E+01	1.0000
Total	2.239E+00	0.0409	0.000E+00	0.0000	0.000E+00	0.0000	3.338E-01	0.0061	1.474E-02	0.0003	2.034E-01	0.0037	5.478E+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)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	3.938E+01	3.947E+01	3.965E+01	4.027E+01	4.199E+01	4.359E+01	4.719E+01	5.649E+01	3.859E+01
Th-232	Ra-228	1.000E+00	0.000E+00	5.260E-01	1.032E+00	2.122E+00	2.991E+00	3.184E+00	3.465E+00	4.213E+00	3.787E+00
Th-232	Th-228	1.000E+00	0.000E+00	4.467E-01	1.817E+00	6.963E+00	1.193E+01	1.284E+01	1.393E+01	1.669E+01	1.240E+01
Th-232	∑DSR(j)		3.938E+01	4.044E+01	4.250E+01	4.936E+01	5.691E+01	5.962E+01	6.459E+01	7.740E+01	5.478E+01

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

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 25 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	6.302E-01	6.182E-01	5.883E-01	5.065E-01	4.393E-01	4.194E-01	3.871E-01	3.230E-01	4.563E-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 = 608 ± 1 years

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Th-232	1.000E+00	608 ± 1	8.549E+01	2.924E-01	8.549E+01	2.924E-01

Summary : Resident Farmer Colonie Site Specific for Cadium with Cover
File : RESFRCDC.RAD

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

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr								
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	3.938E+01	3.947E+01	3.965E+01	4.027E+01	4.199E+01	4.359E+01	4.719E+01	5.649E+01	3.859E+01
Ra-228	Th-232	1.000E+00	2.247E-01	5.260E-01	1.032E+00	2.122E+00	2.991E+00	3.184E+00	3.465E+00	4.213E+00	3.787E+00
Th-228	Th-232	1.000E+00	6.967E-02	4.467E-01	1.817E+00	6.963E+00	1.193E+01	1.284E+01	1.393E+01	1.669E+01	1.240E+01

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

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g								
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	1.000E+00	9.988E-01	9.964E-01	9.880E-01	9.643E-01	9.412E-01	8.859E-01	6.953E-01	2.979E-01
Ra-228	Th-232	1.000E+00	0.000E+00	1.135E-01	3.027E-01	6.945E-01	9.447E-01	9.459E-01	8.926E-01	7.006E-01	3.001E-01
Th-228	Th-232	1.000E+00	0.000E+00	1.863E-02	1.241E-01	5.600E-01	9.331E-01	9.464E-01	8.941E-01	7.018E-01	3.006E-01

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

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RESRAD REPORT – RESIDENT FARMER COLONIE SITE SPECIFIC FOR CADMIUM WITH COVER

Part IV: Concentration of Radionuclides

Concent : Resident Farmer Colonie Site Specific for Cadium with Cover
File : RESFRCDC.RAD

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Part IV: Concentration of Radionuclides

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Concentration of radionuclides in environmental media
at t = 0.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 0.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	0.000E+00	9.680E+01	9.680E+01	9.680E+01	9.680E+01	1.049E+00	6.123E+00	0.000E+00	0.000E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	1.135E-01	0.000E+00	0.000E+00	2.989E-05	9.925E-08
Th-228	1.863E-02	0.000E+00	0.000E+00	7.813E-06	2.594E-08
Th-232	9.988E-01	0.000E+00	0.000E+00	2.022E-03	6.711E-06

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	3.033E-05	1.857E+00	1.497E+00	1.394E+00	1.466E+00	4.444E-02	9.472E-02	7.713E-06	5.364E-05
Th-228	7.756E-06	1.683E+00	1.800E+00	1.631E+00	1.801E+00	1.814E-02	1.139E-01	4.833E-06	4.816E-05
Th-232	2.014E-03	9.701E+01	9.702E+01	9.701E+01	9.702E+01	1.052E+00	6.137E+00	1.307E-03	1.307E-02

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	3.027E-01	0.000E+00	0.000E+00	2.493E-04	8.276E-07
Th-228	1.241E-01	0.000E+00	0.000E+00	1.628E-04	5.406E-07
Th-232	9.964E-01	0.000E+00	0.000E+00	6.059E-03	2.012E-05

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	2.506E-04	4.337E+00	3.976E+00	3.888E+00	3.945E+00	1.116E-01	2.515E-01	4.980E-05	2.950E-04
Th-228	1.624E-04	1.178E+01	1.211E+01	1.179E+01	1.212E+01	1.274E-01	7.658E-01	1.053E-04	1.052E-03
Th-232	6.052E-03	9.744E+01	9.745E+01	9.745E+01	9.746E+01	1.056E+00	6.165E+00	3.988E-03	3.988E-02

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	6.945E-01	0.000E+00	0.000E+00	2.168E-03	7.199E-06
Th-228	5.600E-01	0.000E+00	0.000E+00	2.833E-03	9.404E-06
Th-232	9.880E-01	0.000E+00	0.000E+00	2.014E-02	6.685E-05

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	2.173E-03	9.667E+00	9.304E+00	9.249E+00	9.275E+00	2.562E-01	5.887E-01	3.883E-04	2.095E-03
Th-228	2.830E-03	5.524E+01	5.602E+01	5.580E+01	5.606E+01	5.980E-01	3.543E+00	1.860E-03	1.859E-02
Th-232	2.013E-02	9.893E+01	9.896E+01	9.896E+01	9.897E+01	1.073E+00	6.261E+00	1.333E-02	1.333E-01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	9.447E-01	0.000E+00	0.000E+00	1.134E-02	3.766E-05
Th-228	9.331E-01	0.000E+00	0.000E+00	1.918E-02	6.367E-05
Th-232	9.643E-01	0.000E+00	0.000E+00	5.988E-02	1.988E-04

*The Surface Soil is the top layer of soil within the user-specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	1.136E-02	1.387E+01	1.350E+01	1.347E+01	1.348E+01	3.706E-01	8.548E-01	1.968E-03	1.030E-02
Th-228	1.917E-02	9.845E+01	9.959E+01	9.965E+01	9.969E+01	1.067E+00	6.301E+00	1.264E-02	1.264E-01
Th-232	5.987E-02	1.030E+02	1.031E+02	1.031E+02	1.031E+02	1.119E+00	6.525E+00	3.973E-02	3.973E-01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 5.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	9.459E-01	0.000E+00	0.000E+00	2.147E-02	7.127E-05
Th-228	9.464E-01	0.000E+00	0.000E+00	3.790E-02	1.258E-04
Th-232	9.412E-01	0.000E+00	0.000E+00	9.893E-02	3.285E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 5.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	2.149E-02	1.474E+01	1.437E+01	1.435E+01	1.435E+01	3.951E-01	9.110E-01	3.705E-03	1.928E-02
Th-228	3.788E-02	1.061E+02	1.073E+02	1.074E+02	1.075E+02	1.150E+00	6.793E+00	2.500E-02	2.498E-01
Th-232	9.893E-02	1.068E+02	1.069E+02	1.070E+02	1.070E+02	1.162E+00	6.773E+00	6.566E-02	6.566E-01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	8.926E-01	0.000E+00	0.000E+00	4.629E-02	1.537E-04
Th-228	8.941E-01	0.000E+00	0.000E+00	8.400E-02	2.789E-04
Th-232	8.859E-01	0.000E+00	0.000E+00	1.936E-01	6.428E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	4.633E-02	1.596E+01	1.558E+01	1.558E+01	1.558E+01	4.299E-01	9.902E-01	7.960E-03	4.128E-02
Th-228	8.396E-02	1.150E+02	1.164E+02	1.165E+02	1.165E+02	1.248E+00	7.369E+00	5.542E-02	5.540E-01
Th-232	1.936E-01	1.154E+02	1.156E+02	1.157E+02	1.157E+02	1.258E+00	7.328E+00	1.285E-01	1.285E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	7.006E-01	0.000E+00	0.000E+00	1.353E-01	4.490E-04
Th-228	7.018E-01	0.000E+00	0.000E+00	2.497E-01	8.289E-04
Th-232	6.953E-01	0.000E+00	0.000E+00	5.334E-01	1.771E-03

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	1.354E-01	1.897E+01	1.861E+01	1.865E+01	1.865E+01	5.187E-01	1.190E+00	2.322E-02	1.202E-01
Th-228	2.495E-01	1.366E+02	1.383E+02	1.386E+02	1.386E+02	1.488E+00	8.774E+00	1.648E-01	1.647E+00
Th-232	5.334E-01	1.370E+02	1.376E+02	1.379E+02	1.379E+02	1.506E+00	8.755E+00	3.541E-01	3.541E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+03 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	3.001E-01	3.001E-01	1.377E-07	3.454E-01	1.147E-03
Th-228	3.006E-01	3.006E-01	1.379E-07	6.394E-01	2.123E-03
Th-232	2.979E-01	2.979E-01	1.366E-07	1.342E+00	4.456E-03

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+03 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	3.457E-01	1.248E+01	1.251E+01	1.269E+01	1.269E+01	5.150E-01	9.751E-01	5.926E-02	3.066E-01
Th-228	6.391E-01	8.935E+01	9.101E+01	9.147E+01	9.147E+01	1.054E+00	5.969E+00	4.220E-01	4.218E+00
Th-232	1.342E+00	8.986E+01	9.126E+01	9.205E+01	9.205E+01	1.084E+00	6.052E+00	8.912E-01	8.912E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

RESRAD REPORT – RESIDENT COLONIE SITE SPECIFIC FOR CADMIUM WITH COVER

Part I: Mixture Sums and Single Radionuclide Guidelines

Summary : Resident Colonie Site Specific for Cadmium with Cover

File : RESCDCOV.RAD

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Summary : Resident Colonie Site Specific for Cadmium with Cover

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Dose Conversion Factor (and Related) Parameter Summary

File: 46300905.LIB

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ra-228+D	5.080E-03	5.080E-03	DCF2(1)
B-1	Th-228+D	3.450E-01	3.450E-01	DCF2(2)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(3)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ra-228+D	1.440E-03	1.440E-03	DCF3(1)
D-1	Th-228+D	8.080E-04	8.080E-04	DCF3(2)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(3)
D-34	Food transfer factors:			
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	3.000E-01	1.000E-03	RTF(2,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	4.000E-04	1.000E-04	RTF(2,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	5.000E-06	RTF(2,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	3.000E-01	1.000E-03	RTF(3,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	4.000E-04	1.000E-04	RTF(3,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	5.000E-06	RTF(3,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(1,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(1,2)
D-5				
D-5	Th-228+D , fish	2.000E+02	1.000E+02	BIOFAC(2,1)
D-5	Th-228+D , crustacea and mollusks	2.000E+03	5.000E+02	BIOFAC(2,2)
D-5				
D-5	Th-232 , fish	2.000E+02	1.000E+02	BIOFAC(3,1)
D-5	Th-232 , crustacea and mollusks	2.000E+03	5.000E+02	BIOFAC(3,2)

Summary : Resident Colonie Site Specific for Cadmium with Cover

File : RESCDCOV.RAD

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.400E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.000E+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)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	5.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Th-232	1.000E+00	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(3)
R013	Cover depth (m)	6.096E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.431E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.150E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	3.500E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.990E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.830E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	3.120E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	3.500E+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)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	1.300E+02	6.000E+04	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	1.300E+02	6.000E+04	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.211E-03	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.151E-04	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)	2.700E+02	6.000E+04	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	2.700E+02	6.000E+04	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.835E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.571E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.101E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.120E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.140E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	0.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	2.500E-01	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFIS
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	---	LWIS
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	2.500E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	1.230E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	0.000E+00	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	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	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

Summary : Resident Colonie Site Specific for Cadmium with Cover

File : RESCDCOV.RAD

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	2400.00 square meters	Th-232	1.000E+00
Thickness:	2.00 meters		
Cover Depth:	0.61 meters		

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 25 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	8.889E+00	9.061E+00	9.520E+00	1.105E+01	1.273E+01	1.332E+01	1.439E+01	1.720E+01	1.324E+01
M(t):	3.556E-01	3.624E-01	3.808E-01	4.420E-01	5.091E-01	5.327E-01	5.757E-01	6.881E-01	5.296E-01

Maximum TDOSE(t): 2.128E+01 mrem/yr at t = 608 ± 1 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 = 6.083E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	3.386E+00	0.1591	1.897E-03	0.0001	0.000E+00	0.0000	1.786E+01	0.8393	0.000E+00	0.0000	0.000E+00	0.0000	3.330E-02	0.0016
Total	3.386E+00	0.1591	1.897E-03	0.0001	0.000E+00	0.0000	1.786E+01	0.8393	0.000E+00	0.0000	0.000E+00	0.0000	3.330E-02	0.0016

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

As mrem/yr and Fraction of Total Dose At t = 6.083E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.128E+01	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.128E+01	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Colonie Site Specific for Cadmium with Cover

File : RESCDCOV.RAD

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

As mrem/yr and Fraction of Total Dose At t = 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.
Th-232	1.128E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.889E+00	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.128E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.889E+00	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.889E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.889E+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.
Th-232	4.635E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	9.060E+00	0.9999	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	4.635E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	9.060E+00	0.9999	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.061E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.061E+00	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Colonie Site Specific for Cadmium with Cover

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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 = 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.487E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	9.518E+00	0.9998	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.487E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	9.518E+00	0.9998	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.520E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.520E+00	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Colonie Site Specific for Cadmium with Cover

File : RESCDCOV.RAD

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	5.192E-03	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	1.105E+01	0.9995	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.192E-03	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	1.105E+01	0.9995	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.105E+01	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.105E+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.
Th-232	1.004E-02	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	1.272E+01	0.9992	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.004E-02	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	1.272E+01	0.9992	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.273E+01	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.273E+01	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Colonie Site Specific for Cadmium with Cover

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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+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.
Th-232	1.264E-02	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	1.330E+01	0.9991	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.264E-02	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	1.330E+01	0.9991	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.332E+01	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.332E+01	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Colonie Site Specific for Cadmium with Cover

File : RESCDCOV.RAD

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	2.076E-02	0.0014	0.000E+00	0.0000	0.000E+00	0.0000	1.437E+01	0.9986	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.076E-02	0.0014	0.000E+00	0.0000	0.000E+00	0.0000	1.437E+01	0.9986	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.439E+01	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.439E+01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.510E-01	0.0088	0.000E+00	0.0000	0.000E+00	0.0000	1.705E+01	0.9912	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.510E-01	0.0088	0.000E+00	0.0000	0.000E+00	0.0000	1.705E+01	0.9912	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.720E+01	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.720E+01	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Colonie Site Specific for Cadmium with Cover

File : RESCDCOV.RAD

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	2.093E+00	0.1580	1.187E-03	0.0001	0.000E+00	0.0000	1.113E+01	0.8403	0.000E+00	0.0000	0.000E+00	0.0000	2.084E-02	0.0016
Total	2.093E+00	0.1580	1.187E-03	0.0001	0.000E+00	0.0000	1.113E+01	0.8403	0.000E+00	0.0000	0.000E+00	0.0000	2.084E-02	0.0016

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.324E+01	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.324E+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)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	8.822E+00	8.842E+00	8.881E+00	9.016E+00	9.385E+00	9.731E+00	1.050E+01	1.246E+01	8.143E+00
Th-232	Ra-228	1.000E+00	0.000E+00	1.187E-01	2.314E-01	4.740E-01	6.662E-01	7.075E-01	7.669E-01	9.427E-01	1.368E+00
Th-232	Th-228	1.000E+00	0.000E+00	9.989E-02	4.072E-01	1.561E+00	2.675E+00	2.878E+00	3.122E+00	3.798E+00	3.729E+00
Th-232	∑DSR(j)		8.822E+00	9.061E+00	9.520E+00	1.105E+01	1.273E+01	1.332E+01	1.439E+01	1.720E+01	1.324E+01

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

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 25 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	2.812E+00	2.759E+00	2.626E+00	2.262E+00	1.964E+00	1.877E+00	1.737E+00	1.453E+00	1.888E+00

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 = 608 ± 1 years

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Th-232	1.000E+00	608 ± 1	2.128E+01	1.175E+00	2.128E+01	1.175E+00

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

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr								
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	8.822E+00	8.842E+00	8.881E+00	9.016E+00	9.385E+00	9.731E+00	1.050E+01	1.246E+01	8.143E+00
Ra-228	Th-232	1.000E+00	5.153E-02	1.187E-01	2.314E-01	4.740E-01	6.662E-01	7.075E-01	7.669E-01	9.427E-01	1.368E+00
Th-228	Th-232	1.000E+00	1.552E-02	9.989E-02	4.072E-01	1.561E+00	2.675E+00	2.878E+00	3.122E+00	3.798E+00	3.729E+00

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

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g								
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	1.000E+00	9.988E-01	9.964E-01	9.880E-01	9.643E-01	9.412E-01	8.859E-01	6.953E-01	2.979E-01
Ra-228	Th-232	1.000E+00	0.000E+00	1.135E-01	3.027E-01	6.945E-01	9.447E-01	9.459E-01	8.926E-01	7.006E-01	3.001E-01
Th-228	Th-232	1.000E+00	0.000E+00	1.863E-02	1.241E-01	5.600E-01	9.331E-01	9.464E-01	8.941E-01	7.018E-01	3.006E-01

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

C:\RESRAD1\RESMAIN3.EXEexecution time = 2.69 seconds

RESRAD REPORT – RESIDENT COLONIE SITE SPECIFIC FOR CADMIUM WITH COVER

Part IV: Concentration of Radionuclides

Concent : Resident Colonie Site Specific for Cadmium with Cover
File : RESCDCOV.RAD

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Part IV: Concentration of Radionuclides

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Concentration of radionuclides in environmental media
at t = 0.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 0.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	0.000E+00	9.680E+01	9.680E+01	9.680E+01	9.680E+01	1.049E+00	6.123E+00	0.000E+00	0.000E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	1.135E-01	0.000E+00	0.000E+00	2.989E-05	9.925E-08
Th-228	1.863E-02	0.000E+00	0.000E+00	7.813E-06	2.594E-08
Th-232	9.988E-01	0.000E+00	0.000E+00	2.022E-03	6.711E-06

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	3.033E-05	1.857E+00	1.497E+00	1.393E+00	1.466E+00	4.443E-02	9.471E-02	7.713E-06	5.364E-05
Th-228	7.756E-06	1.683E+00	1.800E+00	1.631E+00	1.801E+00	1.814E-02	1.139E-01	4.833E-06	4.816E-05
Th-232	2.014E-03	9.701E+01	9.702E+01	9.700E+01	9.702E+01	1.052E+00	6.136E+00	1.307E-03	1.307E-02

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	3.027E-01	0.000E+00	0.000E+00	2.493E-04	8.276E-07
Th-228	1.241E-01	0.000E+00	0.000E+00	1.628E-04	5.406E-07
Th-232	9.964E-01	0.000E+00	0.000E+00	6.059E-03	2.012E-05

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	2.506E-04	4.337E+00	3.976E+00	3.887E+00	3.945E+00	1.116E-01	2.515E-01	4.980E-05	2.950E-04
Th-228	1.624E-04	1.178E+01	1.211E+01	1.179E+01	1.212E+01	1.274E-01	7.658E-01	1.053E-04	1.052E-03
Th-232	6.052E-03	9.744E+01	9.744E+01	9.743E+01	9.744E+01	1.056E+00	6.164E+00	3.988E-03	3.988E-02

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	6.945E-01	0.000E+00	0.000E+00	2.168E-03	7.199E-06
Th-228	5.600E-01	0.000E+00	0.000E+00	2.833E-03	9.404E-06
Th-232	9.880E-01	0.000E+00	0.000E+00	2.014E-02	6.685E-05

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	2.173E-03	9.667E+00	9.301E+00	9.245E+00	9.271E+00	2.561E-01	5.884E-01	3.883E-04	2.095E-03
Th-228	2.830E-03	5.524E+01	5.601E+01	5.580E+01	5.606E+01	5.980E-01	3.543E+00	1.860E-03	1.859E-02
Th-232	2.013E-02	9.892E+01	9.893E+01	9.892E+01	9.893E+01	1.073E+00	6.258E+00	1.333E-02	1.333E-01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	9.447E-01	0.000E+00	0.000E+00	1.134E-02	3.766E-05
Th-228	9.331E-01	0.000E+00	0.000E+00	1.918E-02	6.367E-05
Th-232	9.643E-01	0.000E+00	0.000E+00	5.988E-02	1.988E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	1.136E-02	1.386E+01	1.348E+01	1.345E+01	1.345E+01	3.700E-01	8.534E-01	1.968E-03	1.030E-02
Th-228	1.917E-02	9.844E+01	9.957E+01	9.961E+01	9.965E+01	1.066E+00	6.299E+00	1.264E-02	1.264E-01
Th-232	5.987E-02	1.030E+02	1.030E+02	1.030E+02	1.030E+02	1.117E+00	6.518E+00	3.973E-02	3.973E-01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 5.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	9.459E-01	0.000E+00	0.000E+00	2.147E-02	7.127E-05
Th-228	9.464E-01	0.000E+00	0.000E+00	3.790E-02	1.258E-04
Th-232	9.412E-01	0.000E+00	0.000E+00	9.893E-02	3.285E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 5.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	2.149E-02	1.474E+01	1.434E+01	1.431E+01	1.431E+01	3.939E-01	9.083E-01	3.705E-03	1.928E-02
Th-228	3.788E-02	1.061E+02	1.073E+02	1.074E+02	1.074E+02	1.149E+00	6.788E+00	2.500E-02	2.498E-01
Th-232	9.893E-02	1.068E+02	1.068E+02	1.068E+02	1.068E+02	1.160E+00	6.761E+00	6.566E-02	6.566E-01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	8.926E-01	0.000E+00	0.000E+00	4.629E-02	1.537E-04
Th-228	8.941E-01	0.000E+00	0.000E+00	8.400E-02	2.789E-04
Th-232	8.859E-01	0.000E+00	0.000E+00	1.936E-01	6.428E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	4.633E-02	1.595E+01	1.552E+01	1.549E+01	1.549E+01	4.275E-01	9.844E-01	7.960E-03	4.128E-02
Th-228	8.396E-02	1.150E+02	1.163E+02	1.163E+02	1.164E+02	1.246E+00	7.358E+00	5.542E-02	5.540E-01
Th-232	1.936E-01	1.153E+02	1.153E+02	1.153E+02	1.153E+02	1.254E+00	7.304E+00	1.285E-01	1.285E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	7.006E-01	0.000E+00	0.000E+00	1.353E-01	4.490E-04
Th-228	7.018E-01	0.000E+00	0.000E+00	2.497E-01	8.289E-04
Th-232	6.953E-01	0.000E+00	0.000E+00	5.334E-01	1.771E-03

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	1.354E-01	1.893E+01	1.842E+01	1.838E+01	1.838E+01	5.114E-01	1.173E+00	2.322E-02	1.202E-01
Th-228	2.495E-01	1.365E+02	1.380E+02	1.381E+02	1.381E+02	1.483E+00	8.743E+00	1.648E-01	1.647E+00
Th-232	5.334E-01	1.368E+02	1.368E+02	1.368E+02	1.368E+02	1.494E+00	8.687E+00	3.541E-01	3.541E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+03 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	3.001E-01	3.001E-01	1.377E-07	3.454E-01	1.147E-03
Th-228	3.006E-01	3.006E-01	1.379E-07	6.394E-01	2.123E-03
Th-232	2.979E-01	2.979E-01	1.366E-07	1.342E+00	4.456E-03

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+03 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	3.457E-01	1.236E+01	1.203E+01	1.201E+01	1.201E+01	4.964E-01	9.317E-01	5.926E-02	3.066E-01
Th-228	6.391E-01	8.911E+01	9.011E+01	9.019E+01	9.018E+01	1.040E+00	5.888E+00	4.220E-01	4.218E+00
Th-232	1.342E+00	8.936E+01	8.936E+01	8.936E+01	8.936E+01	1.055E+00	5.881E+00	8.912E-01	8.912E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

RESRAD REPORT – INDUSTRIAL COLONIE SITE SPECIFIC FOR CADMIUM WITH COVER

Part I: Mixture Sums and Single Radionuclide Guidelines

Summary : Industrial Colonie Site Specific for Cadmium with Cover

File : INDCDCOV.RAD

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Summary : Industrial Colonie Site Specific for Cadmium with Cover

File : INDCDCOV.RAD

Dose Conversion Factor (and Related) Parameter Summary

File: 46300905.LIB

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ra-228+D	5.080E-03	5.080E-03	DCF2(1)
B-1	Th-228+D	3.450E-01	3.450E-01	DCF2(2)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(3)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ra-228+D	1.440E-03	1.440E-03	DCF3(1)
D-1	Th-228+D	8.080E-04	8.080E-04	DCF3(2)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(3)
D-34	Food transfer factors:			
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	3.000E-01	1.000E-03	RTF(2,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	4.000E-04	1.000E-04	RTF(2,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	5.000E-06	RTF(2,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	3.000E-01	1.000E-03	RTF(3,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	4.000E-04	1.000E-04	RTF(3,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	5.000E-06	RTF(3,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(1,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(1,2)
D-5				
D-5	Th-228+D , fish	2.000E+02	1.000E+02	BIOFAC(2,1)
D-5	Th-228+D , crustacea and mollusks	2.000E+03	5.000E+02	BIOFAC(2,2)
D-5				
D-5	Th-232 , fish	2.000E+02	1.000E+02	BIOFAC(3,1)
D-5	Th-232 , crustacea and mollusks	2.000E+03	5.000E+02	BIOFAC(3,2)

Summary : Industrial Colonie Site Specific for Cadmium with Cover

File : INDCDCOV.RAD

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.400E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	5.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Th-232	1.000E+00	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(3)
R013	Cover depth (m)	6.096E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.431E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.150E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	3.500E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.990E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.830E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	1.300E+02	6.000E+04	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.211E-03	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.151E-04	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)	2.700E+02	6.000E+04	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.835E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	1.426E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.426E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	0.000E+00	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS

Summary : Industrial Colonie Site Specific for Cadmium with Cover

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	513	---	---	KYMAX

Summary of Pathway Selections

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

Summary : Industrial Colonie Site Specific for Cadmium with Cover
File : INDCDCOV.RAD

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	2400.00 square meters	Th-232	1.000E+00
Thickness:	2.00 meters		
Cover Depth:	0.61 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 25 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	5.284E-05	2.171E-04	6.966E-04	2.432E-03	4.702E-03	5.922E-03	9.725E-03	7.074E-02	9.885E-01
M(t):	2.113E-06	8.683E-06	2.786E-05	9.727E-05	1.881E-04	2.369E-04	3.890E-04	2.829E-03	3.954E-02

Maximum TDOSE(t): 1.600E+00 mrem/yr at t = 608 ± 1 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 = 6.081E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.586E+00	0.9916	1.015E-03	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.237E-02	0.0077
Total	1.586E+00	0.9916	1.015E-03	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.237E-02	0.0077

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 6.081E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.600E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.600E+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.
Th-232	5.284E-05	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.284E-05	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.284E-05	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.284E-05	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	2.171E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.171E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 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.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.171E-04	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.171E-04	1.0000

*Sum of all water independent and dependent pathways.

Summary : Industrial Colonie Site Specific for Cadmium with Cover

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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 = 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	6.966E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	6.966E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.966E-04	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.966E-04	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+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.
Th-232	2.432E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.432E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 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.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.432E-03	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.432E-03	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 = 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.
Th-232	4.702E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	4.702E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 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.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.702E-03	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.702E-03	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
Th-232	5.922E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.922E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.922E-03	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.922E-03	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+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	9.725E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	9.725E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.725E-03	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.725E-03	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	7.074E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	7.074E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.074E-02	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.074E-02	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	9.801E-01	0.9915	6.353E-04	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.745E-03	0.0078
Total	9.801E-01	0.9915	6.353E-04	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.745E-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 = 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.885E-01	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.885E-01	1.0000

*Sum of all water independent and dependent pathways.

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Dose/Source Ratios Summed Over All Pathways

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	t=	DSR(j,t) (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00		1.256E-12	1.292E-12	1.368E-12	1.671E-12	2.957E-12	5.235E-12	2.183E-11	6.593E-09	4.787E-03
Th-232	Ra-228	1.000E+00		0.000E+00	9.547E-05	2.037E-04	4.616E-04	7.893E-04	1.015E-03	1.798E-03	1.751E-02	3.633E-01
Th-232	Th-228	1.000E+00		0.000E+00	1.216E-04	4.929E-04	1.970E-03	3.912E-03	4.907E-03	7.927E-03	5.323E-02	6.204E-01
Th-232	∑DSR(j)			1.256E-12	2.171E-04	6.966E-04	2.432E-03	4.702E-03	5.922E-03	9.725E-03	7.074E-02	9.885E-01

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).

The DSR includes contributions from associated (half-life ≤ 0.5 yr) daughters.

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

Basic Radiation Dose Limit = 25 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	*1.096E+05	*1.096E+05	3.589E+04	1.028E+04	5.317E+03	4.221E+03	2.571E+03	3.534E+02	2.529E+01

*At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 608 ± 1 years

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Th-232	1.000E+00	608 ± 1	1.600E+00	1.563E+01	1.600E+00	1.563E+01

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Individual Nuclide Dose Summed Over All Pathways

Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr								
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	1.256E-12	1.292E-12	1.368E-12	1.671E-12	2.957E-12	5.235E-12	2.183E-11	6.593E-09	4.787E-03
Ra-228	Th-232	1.000E+00	3.318E-05	9.547E-05	2.037E-04	4.616E-04	7.893E-04	1.015E-03	1.798E-03	1.751E-02	3.633E-01
Th-228	Th-232	1.000E+00	1.965E-05	1.216E-04	4.929E-04	1.970E-03	3.912E-03	4.907E-03	7.927E-03	5.323E-02	6.204E-01

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

Individual Nuclide Soil Concentration

Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g								
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	1.000E+00	9.988E-01	9.964E-01	9.880E-01	9.643E-01	9.412E-01	8.859E-01	6.953E-01	2.979E-01
Ra-228	Th-232	1.000E+00	0.000E+00	1.135E-01	3.027E-01	6.945E-01	9.447E-01	9.459E-01	8.926E-01	7.006E-01	3.001E-01
Th-228	Th-232	1.000E+00	0.000E+00	1.863E-02	1.241E-01	5.600E-01	9.331E-01	9.464E-01	8.941E-01	7.018E-01	3.006E-01

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

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RESRAD REPORT – INDUSTRIAL COLONIE SITE SPECIFIC FOR CADMIUM WITH COVER

Part IV: Concentration of Radionuclides

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Part IV: Concentration of Radionuclides

Concentration of radionuclides in different media
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Time= 1.000E+03 10

Concentration of radionuclides in environmental media
at t = 0.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 0.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	0.000E+00	9.680E+01	9.680E+01	9.680E+01	9.680E+01	1.049E+00	6.123E+00	0.000E+00	0.000E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	1.135E-01	0.000E+00	0.000E+00	2.989E-05	9.925E-08
Th-228	1.863E-02	0.000E+00	0.000E+00	7.813E-06	2.594E-08
Th-232	9.988E-01	0.000E+00	0.000E+00	2.022E-03	6.711E-06

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	3.033E-05	1.857E+00	1.497E+00	1.394E+00	1.466E+00	4.444E-02	9.472E-02	7.713E-06	5.364E-05
Th-228	7.756E-06	1.683E+00	1.800E+00	1.631E+00	1.801E+00	1.814E-02	1.139E-01	4.833E-06	4.816E-05
Th-232	2.014E-03	9.701E+01	9.702E+01	9.701E+01	9.702E+01	1.052E+00	6.137E+00	1.307E-03	1.307E-02

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	3.027E-01	0.000E+00	0.000E+00	2.493E-04	8.276E-07
Th-228	1.241E-01	0.000E+00	0.000E+00	1.628E-04	5.406E-07
Th-232	9.964E-01	0.000E+00	0.000E+00	6.059E-03	2.012E-05

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	2.506E-04	4.337E+00	3.976E+00	3.888E+00	3.945E+00	1.116E-01	2.515E-01	4.980E-05	2.950E-04
Th-228	1.624E-04	1.178E+01	1.211E+01	1.179E+01	1.212E+01	1.274E-01	7.658E-01	1.053E-04	1.052E-03
Th-232	6.052E-03	9.744E+01	9.745E+01	9.745E+01	9.746E+01	1.056E+00	6.165E+00	3.988E-03	3.988E-02

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

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File : INDCDCOV.RAD

Concentration of radionuclides in environmental media
at t = 1.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	6.945E-01	0.000E+00	0.000E+00	2.168E-03	7.199E-06
Th-228	5.600E-01	0.000E+00	0.000E+00	2.833E-03	9.404E-06
Th-232	9.880E-01	0.000E+00	0.000E+00	2.014E-02	6.685E-05

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	2.173E-03	9.667E+00	9.304E+00	9.249E+00	9.275E+00	2.562E-01	5.887E-01	3.883E-04	2.095E-03
Th-228	2.830E-03	5.524E+01	5.602E+01	5.580E+01	5.606E+01	5.980E-01	3.543E+00	1.860E-03	1.859E-02
Th-232	2.013E-02	9.893E+01	9.896E+01	9.896E+01	9.897E+01	1.073E+00	6.261E+00	1.333E-02	1.333E-01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	9.447E-01	0.000E+00	0.000E+00	1.134E-02	3.766E-05
Th-228	9.331E-01	0.000E+00	0.000E+00	1.918E-02	6.367E-05
Th-232	9.643E-01	0.000E+00	0.000E+00	5.988E-02	1.988E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	1.136E-02	1.387E+01	1.350E+01	1.347E+01	1.348E+01	3.706E-01	8.548E-01	1.968E-03	1.030E-02
Th-228	1.917E-02	9.845E+01	9.959E+01	9.965E+01	9.969E+01	1.067E+00	6.301E+00	1.264E-02	1.264E-01
Th-232	5.987E-02	1.030E+02	1.031E+02	1.031E+02	1.031E+02	1.119E+00	6.525E+00	3.973E-02	3.973E-01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 5.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	9.459E-01	0.000E+00	0.000E+00	2.147E-02	7.127E-05
Th-228	9.464E-01	0.000E+00	0.000E+00	3.790E-02	1.258E-04
Th-232	9.412E-01	0.000E+00	0.000E+00	9.893E-02	3.285E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 5.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	2.149E-02	1.474E+01	1.437E+01	1.435E+01	1.435E+01	3.951E-01	9.110E-01	3.705E-03	1.928E-02
Th-228	3.788E-02	1.061E+02	1.073E+02	1.074E+02	1.075E+02	1.150E+00	6.793E+00	2.500E-02	2.498E-01
Th-232	9.893E-02	1.068E+02	1.069E+02	1.070E+02	1.070E+02	1.162E+00	6.773E+00	6.566E-02	6.566E-01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	8.926E-01	0.000E+00	0.000E+00	4.629E-02	1.537E-04
Th-228	8.941E-01	0.000E+00	0.000E+00	8.400E-02	2.789E-04
Th-232	8.859E-01	0.000E+00	0.000E+00	1.936E-01	6.428E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	4.633E-02	1.596E+01	1.558E+01	1.558E+01	1.558E+01	4.299E-01	9.902E-01	7.960E-03	4.128E-02
Th-228	8.396E-02	1.150E+02	1.164E+02	1.165E+02	1.165E+02	1.248E+00	7.369E+00	5.542E-02	5.540E-01
Th-232	1.936E-01	1.154E+02	1.156E+02	1.157E+02	1.157E+02	1.258E+00	7.328E+00	1.285E-01	1.285E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	7.006E-01	0.000E+00	0.000E+00	1.353E-01	4.490E-04
Th-228	7.018E-01	0.000E+00	0.000E+00	2.497E-01	8.289E-04
Th-232	6.953E-01	0.000E+00	0.000E+00	5.334E-01	1.771E-03

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	1.354E-01	1.897E+01	1.861E+01	1.865E+01	1.865E+01	5.187E-01	1.190E+00	2.322E-02	1.202E-01
Th-228	2.495E-01	1.366E+02	1.383E+02	1.386E+02	1.386E+02	1.488E+00	8.774E+00	1.648E-01	1.647E+00
Th-232	5.334E-01	1.370E+02	1.376E+02	1.379E+02	1.379E+02	1.506E+00	8.755E+00	3.541E-01	3.541E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+03 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	3.001E-01	3.001E-01	1.377E-07	3.454E-01	1.147E-03
Th-228	3.006E-01	3.006E-01	1.379E-07	6.394E-01	2.123E-03
Th-232	2.979E-01	2.979E-01	1.366E-07	1.342E+00	4.456E-03

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+03 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	3.457E-01	1.248E+01	1.251E+01	1.269E+01	1.269E+01	5.150E-01	9.751E-01	5.926E-02	3.066E-01
Th-228	6.391E-01	8.935E+01	9.101E+01	9.147E+01	9.147E+01	1.054E+00	5.969E+00	4.220E-01	4.218E+00
Th-232	1.342E+00	8.986E+01	9.126E+01	9.205E+01	9.205E+01	1.084E+00	6.052E+00	8.912E-01	8.912E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

RESRAD REPORT – RESIDENT FARMER COLONIE SITE SPECIFIC FOR COPPER WITH COVER

Part I: Mixture Sums and Single Radionuclide Guidelines

Summary : Resident Farmer Colonie Site Specific for Copper with Cover
File : RESFRCUC.RAD

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Summary : Resident Farmer Colonie Site Specific for Copper with Cover
File : RESFRCUC.RAD

Dose Conversion Factor (and Related) Parameter Summary
File: 02935427.LIB

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ra-228+D	5.080E-03	5.080E-03	DCF2(1)
B-1	Th-228+D	3.450E-01	3.450E-01	DCF2(2)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(3)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ra-228+D	1.440E-03	1.440E-03	DCF3(1)
D-1	Th-228+D	8.080E-04	8.080E-04	DCF3(2)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(3)
D-34	Food transfer factors:			
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.300E-01	1.000E-03	RTF(2,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-02	1.000E-04	RTF(2,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	5.000E-06	RTF(2,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.300E-01	1.000E-03	RTF(3,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-02	1.000E-04	RTF(3,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	5.000E-06	RTF(3,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(1,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(1,2)
D-5				
D-5	Th-228+D , fish	2.000E+02	1.000E+02	BIOFAC(2,1)
D-5	Th-228+D , crustacea and mollusks	4.000E+02	5.000E+02	BIOFAC(2,2)
D-5				
D-5	Th-232 , fish	2.000E+02	1.000E+02	BIOFAC(3,1)
D-5	Th-232 , crustacea and mollusks	4.000E+02	5.000E+02	BIOFAC(3,2)

Summary : Resident Farmer Colonie Site Specific for Copper with Cover

File : RESFRCUC.RAD

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.400E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.000E+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)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	5.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Th-232	1.000E+00	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(3)
R013	Cover depth (m)	6.096E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.431E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.150E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	3.500E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.990E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.830E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	3.120E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	3.500E+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)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	2.200E+01	6.000E+04	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	2.200E+01	6.000E+04	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.119E-03	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.151E-04	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)	2.700E+02	6.000E+04	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	2.700E+02	6.000E+04	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.835E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.571E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.101E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.120E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.140E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	2.330E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.510E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	4.785E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	1.000E+00	-1	---	FPLANT
R018	Contamination fraction of meat	1.000E+00	-1	---	FMEAT
R018	Contamination fraction of milk	1.000E+00	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	2.710E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	6.325E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	6.000E+01	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	2.500E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	1.230E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	1.500E-01	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	0.000E+00	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	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	active
5 -- milk ingestion	active
6 -- aquatic foods	suppressed
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

Summary : Resident Farmer Colonie Site Specific for Copper with Cover
File : RESFRCUC.RAD

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	2400.00 square meters	Th-232	1.000E+00
Thickness:	2.00 meters		
Cover Depth:	0.61 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 25 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	2.095E+01	2.154E+01	2.295E+01	2.725E+01	3.151E+01	3.251E+01	3.321E+01	3.076E+01	3.786E-01
M(t):	8.379E-01	8.618E-01	9.181E-01	1.090E+00	1.260E+00	1.300E+00	1.328E+00	1.230E+00	1.515E-02

Maximum TDOSE(t): 3.322E+01 mrem/yr at t = 107.2 ± 0.2 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 = 1.072E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.258E-02	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	1.450E+01	0.4364	1.716E+00	0.0517	3.020E+00	0.0909	0.000E+00	0.0000
Total	1.258E-02	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	1.450E+01	0.4364	1.716E+00	0.0517	3.020E+00	0.0909	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.072E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	9.560E+00	0.2878	0.000E+00	0.0000	0.000E+00	0.0000	1.372E+00	0.0413	1.329E+00	0.0400	1.711E+00	0.0515	3.322E+01	1.0000
Total	9.560E+00	0.2878	0.000E+00	0.0000	0.000E+00	0.0000	1.372E+00	0.0413	1.329E+00	0.0400	1.711E+00	0.0515	3.322E+01	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Farmer Colonie Site Specific for Copper with Cover

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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.
Th-232	1.126E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.544E+01	0.7371	2.029E+00	0.0968	3.392E+00	0.1619	0.000E+00	0.0000
Total	1.126E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.544E+01	0.7371	2.029E+00	0.0968	3.392E+00	0.1619	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	5.947E-02	0.0028	0.000E+00	0.0000	0.000E+00	0.0000	8.140E-03	0.0004	7.473E-03	0.0004	1.069E-02	0.0005	2.095E+01	1.0000
Total	5.947E-02	0.0028	0.000E+00	0.0000	0.000E+00	0.0000	8.140E-03	0.0004	7.473E-03	0.0004	1.069E-02	0.0005	2.095E+01	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Farmer Colonie Site Specific for Copper with Cover

File : RESFRCUC.RAD

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	4.617E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.580E+01	0.7333	2.044E+00	0.0949	3.442E+00	0.1598	0.000E+00	0.0000
Total	4.617E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.580E+01	0.7333	2.044E+00	0.0949	3.442E+00	0.1598	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.788E-01	0.0083	0.000E+00	0.0000	0.000E+00	0.0000	2.527E-02	0.0012	2.434E-02	0.0011	3.225E-02	0.0015	2.154E+01	1.0000
Total	1.788E-01	0.0083	0.000E+00	0.0000	0.000E+00	0.0000	2.527E-02	0.0012	2.434E-02	0.0011	3.225E-02	0.0015	2.154E+01	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Farmer Colonie Site Specific for Copper with Cover

File : RESFRCUC.RAD

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.474E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	1.666E+01	0.7256	2.103E+00	0.0916	3.584E+00	0.1561	0.000E+00	0.0000
Total	1.474E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	1.666E+01	0.7256	2.103E+00	0.0916	3.584E+00	0.1561	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	4.163E-01	0.0181	0.000E+00	0.0000	0.000E+00	0.0000	5.938E-02	0.0026	5.783E-02	0.0025	7.508E-02	0.0033	2.295E+01	1.0000
Total	4.163E-01	0.0181	0.000E+00	0.0000	0.000E+00	0.0000	5.938E-02	0.0026	5.783E-02	0.0025	7.508E-02	0.0033	2.295E+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.
Th-232	5.035E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	1.910E+01	0.7009	2.316E+00	0.0850	4.026E+00	0.1477	0.000E+00	0.0000
Total	5.035E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	1.910E+01	0.7009	2.316E+00	0.0850	4.026E+00	0.1477	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.234E+00	0.0453	0.000E+00	0.0000	0.000E+00	0.0000	1.768E-01	0.0065	1.725E-01	0.0063	2.221E-01	0.0081	2.725E+01	1.0000
Total	1.234E+00	0.0453	0.000E+00	0.0000	0.000E+00	0.0000	1.768E-01	0.0065	1.725E-01	0.0063	2.221E-01	0.0081	2.725E+01	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Farmer Colonie Site Specific for Copper with Cover

File : RESFRCUC.RAD

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	8.879E-03	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	1.998E+01	0.6340	2.370E+00	0.0752	4.167E+00	0.1322	0.000E+00	0.0000
Total	8.879E-03	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	1.998E+01	0.6340	2.370E+00	0.0752	4.167E+00	0.1322	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	3.410E+00	0.1082	0.000E+00	0.0000	0.000E+00	0.0000	4.892E-01	0.0155	4.752E-01	0.0151	6.116E-01	0.0194	3.151E+01	1.0000
Total	3.410E+00	0.1082	0.000E+00	0.0000	0.000E+00	0.0000	4.892E-01	0.0155	4.752E-01	0.0151	6.116E-01	0.0194	3.151E+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+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.
Th-232	9.995E-03	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	1.863E+01	0.5731	2.206E+00	0.0679	3.882E+00	0.1194	0.000E+00	0.0000
Total	9.995E-03	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	1.863E+01	0.5731	2.206E+00	0.0679	3.882E+00	0.1194	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
Th-232	5.323E+00	0.1637	0.000E+00	0.0000	0.000E+00	0.0000	7.637E-01	0.0235	7.406E-01	0.0228	9.536E-01	0.0293	3.251E+01	1.0000
Total	5.323E+00	0.1637	0.000E+00	0.0000	0.000E+00	0.0000	7.637E-01	0.0235	7.406E-01	0.0228	9.536E-01	0.0293	3.251E+01	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Farmer Colonie Site Specific for Copper with Cover

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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+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.223E-02	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	1.499E+01	0.4512	1.774E+00	0.0534	3.122E+00	0.0940	0.000E+00	0.0000
Total	1.223E-02	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	1.499E+01	0.4512	1.774E+00	0.0534	3.122E+00	0.0940	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	9.112E+00	0.2744	0.000E+00	0.0000	0.000E+00	0.0000	1.308E+00	0.0394	1.266E+00	0.0381	1.631E+00	0.0491	3.321E+01	1.0000
Total	9.112E+00	0.2744	0.000E+00	0.0000	0.000E+00	0.0000	1.308E+00	0.0394	1.266E+00	0.0381	1.631E+00	0.0491	3.321E+01	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Farmer Colonie Site Specific for Copper with Cover

File : RESFRCUC.RAD

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	2.725E-02	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	5.455E+00	0.1773	6.458E-01	0.0210	1.136E+00	0.0369	0.000E+00	0.0000
Total	2.725E-02	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	5.455E+00	0.1773	6.458E-01	0.0210	1.136E+00	0.0369	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.608E+01	0.5227	0.000E+00	0.0000	0.000E+00	0.0000	2.307E+00	0.0750	2.233E+00	0.0726	2.876E+00	0.0935	3.076E+01	1.0000
Total	1.608E+01	0.5227	0.000E+00	0.0000	0.000E+00	0.0000	2.307E+00	0.0750	2.233E+00	0.0726	2.876E+00	0.0935	3.076E+01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	6.027E-03	0.0159	3.255E-06	0.0000	0.000E+00	0.0000	5.692E-02	0.1503	7.723E-03	0.0204	1.268E-02	0.0335	5.794E-05	0.0002
Total	6.027E-03	0.0159	3.255E-06	0.0000	0.000E+00	0.0000	5.692E-02	0.1503	7.723E-03	0.0204	1.268E-02	0.0335	5.794E-05	0.0002

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	2.022E-01	0.5340	0.000E+00	0.0000	0.000E+00	0.0000	2.902E-02	0.0766	2.796E-02	0.0738	3.608E-02	0.0953	3.786E-01	1.0000
Total	2.022E-01	0.5340	0.000E+00	0.0000	0.000E+00	0.0000	2.902E-02	0.0766	2.796E-02	0.0738	3.608E-02	0.0953	3.786E-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)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	2.072E+01	2.082E+01	2.101E+01	2.166E+01	2.322E+01	2.444E+01	2.639E+01	2.745E+01	3.338E-01
Th-232	Ra-228	1.000E+00	0.000E+00	4.890E-01	9.879E-01	2.024E+00	2.646E+00	2.569E+00	2.211E+00	1.178E+00	1.686E-02
Th-232	Th-228	1.000E+00	0.000E+00	2.354E-01	9.516E-01	3.574E+00	5.644E+00	5.498E+00	4.607E+00	2.130E+00	2.798E-02
Th-232	∑DSR(j)		2.072E+01	2.154E+01	2.295E+01	2.725E+01	3.151E+01	3.251E+01	3.321E+01	3.076E+01	3.786E-01

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

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 25 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	1.193E+00	1.160E+00	1.089E+00	9.173E-01	7.934E-01	7.690E-01	7.528E-01	8.128E-01	6.602E+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 = 107.2 ± 0.2 years

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Th-232	1.000E+00	107.2 ± 0.2	3.322E+01	7.526E-01	3.322E+01	7.526E-01

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

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr								
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	2.072E+01	2.082E+01	2.101E+01	2.166E+01	2.322E+01	2.444E+01	2.639E+01	2.745E+01	3.338E-01
Ra-228	Th-232	1.000E+00	1.900E-01	4.890E-01	9.879E-01	2.024E+00	2.646E+00	2.569E+00	2.211E+00	1.178E+00	1.686E-02
Th-228	Th-232	1.000E+00	3.702E-02	2.354E-01	9.516E-01	3.574E+00	5.644E+00	5.498E+00	4.607E+00	2.130E+00	2.798E-02

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

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g								
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	1.000E+00	9.929E-01	9.789E-01	9.313E-01	8.077E-01	7.005E-01	4.907E-01	1.182E-01	8.094E-04
Ra-228	Th-232	1.000E+00	0.000E+00	1.131E-01	2.999E-01	6.705E-01	8.278E-01	7.399E-01	5.200E-01	1.252E-01	8.578E-04
Th-228	Th-232	1.000E+00	0.000E+00	1.859E-02	1.232E-01	5.448E-01	8.295E-01	7.523E-01	5.296E-01	1.275E-01	8.736E-04

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

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RESRAD REPORT – RESIDENT FARMER COLONIE SITE SPECIFIC FOR COPPER WITH COVER

Part IV: Concentration of Radionuclides

Concent : Resident Farmer Colonie Site Specific for Copper with Cover
File : RESFRCUC.RAD

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Part IV: Concentration of Radionuclides

Concentration of radionuclides in different media

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Concentration of radionuclides in environmental media
at t = 0.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 0.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	0.000E+00	4.195E+01	4.195E+01	4.195E+01	4.195E+01	1.137E+01	5.306E+00	0.000E+00	0.000E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	1.131E-01	0.000E+00	0.000E+00	2.346E-04	7.789E-07
Th-228	1.859E-02	0.000E+00	0.000E+00	5.015E-05	1.665E-07
Th-232	9.929E-01	0.000E+00	0.000E+00	9.135E-02	3.033E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	2.633E-04	1.599E+00	1.475E+00	1.390E+00	1.462E+00	1.125E-01	9.421E-02	1.745E-04	4.610E-04
Th-228	4.994E-05	7.388E-01	7.794E-01	7.053E-01	7.787E-01	1.889E-01	9.851E-02	3.192E-05	6.463E-05
Th-232	9.109E-02	4.183E+01	4.192E+01	4.197E+01	4.197E+01	1.142E+01	5.321E+00	5.944E-02	1.189E-01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	2.999E-01	0.000E+00	0.000E+00	1.946E-03	6.460E-06
Th-228	1.232E-01	0.000E+00	0.000E+00	1.072E-03	3.559E-06
Th-232	9.789E-01	0.000E+00	0.000E+00	2.722E-01	9.037E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	2.032E-03	4.044E+00	3.923E+00	3.856E+00	3.912E+00	1.797E-01	2.492E-01	7.325E-04	2.420E-03
Th-228	1.070E-03	5.103E+00	5.216E+00	5.076E+00	5.217E+00	1.352E+00	6.597E-01	6.979E-04	1.402E-03
Th-232	2.719E-01	4.158E+01	4.187E+01	4.202E+01	4.202E+01	1.152E+01	5.349E+00	1.795E-01	3.591E-01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	6.705E-01	0.000E+00	0.000E+00	1.661E-02	5.513E-05
Th-228	5.448E-01	0.000E+00	0.000E+00	1.970E-02	6.539E-05
Th-232	9.313E-01	0.000E+00	0.000E+00	8.862E-01	2.942E-03

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	1.689E-02	9.087E+00	8.985E+00	8.961E+00	8.984E+00	3.202E-01	5.709E-01	4.096E-03	1.642E-02
Th-228	1.968E-02	2.337E+01	2.365E+01	2.357E+01	2.368E+01	6.277E+00	2.995E+00	1.296E-02	2.597E-02
Th-232	8.860E-01	4.072E+01	4.165E+01	4.217E+01	4.217E+01	1.187E+01	5.441E+00	5.873E-01	1.175E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	8.278E-01	0.000E+00	0.000E+00	8.217E-02	2.728E-04
Th-228	8.295E-01	0.000E+00	0.000E+00	1.353E-01	4.493E-04
Th-232	8.077E-01	0.000E+00	0.000E+00	2.488E+00	8.260E-03

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	8.296E-02	1.194E+01	1.191E+01	1.195E+01	1.195E+01	4.095E-01	7.625E-01	1.741E-02	7.561E-02
Th-228	1.353E-01	3.807E+01	3.855E+01	3.865E+01	3.866E+01	1.034E+01	4.902E+00	8.926E-02	1.788E-01
Th-232	2.488E+00	3.824E+01	4.087E+01	4.233E+01	4.233E+01	1.271E+01	5.653E+00	1.651E+00	3.302E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 5.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	7.399E-01	0.000E+00	0.000E+00	1.471E-01	4.883E-04
Th-228	7.523E-01	0.000E+00	0.000E+00	2.570E-01	8.532E-04
Th-232	7.005E-01	0.000E+00	0.000E+00	3.887E+00	1.290E-02

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 5.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	1.483E-01	1.136E+01	1.141E+01	1.149E+01	1.149E+01	4.046E-01	7.371E-01	3.030E-02	1.337E-01
Th-228	2.569E-01	3.673E+01	3.732E+01	3.751E+01	3.750E+01	1.010E+01	4.771E+00	1.696E-01	3.397E-01
Th-232	3.886E+00	3.579E+01	3.990E+01	4.217E+01	4.217E+01	1.337E+01	5.801E+00	2.580E+00	5.159E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	5.200E-01	0.000E+00	0.000E+00	2.773E-01	9.205E-04
Th-228	5.296E-01	0.000E+00	0.000E+00	5.026E-01	1.668E-03
Th-232	4.907E-01	0.000E+00	0.000E+00	6.655E+00	2.209E-02

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	2.794E-01	9.213E+00	9.423E+00	9.578E+00	9.577E+00	3.665E-01	6.242E-01	5.611E-02	2.499E-01
Th-228	5.023E-01	2.975E+01	3.055E+01	3.087E+01	3.086E+01	8.454E+00	3.961E+00	3.317E-01	6.643E-01
Th-232	6.655E+00	2.997E+01	3.702E+01	4.090E+01	4.090E+01	1.441E+01	5.972E+00	4.418E+00	8.836E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	1.252E-01	0.000E+00	0.000E+00	5.165E-01	1.715E-03
Th-228	1.275E-01	0.000E+00	0.000E+00	9.546E-01	3.169E-03
Th-232	1.182E-01	0.000E+00	0.000E+00	1.174E+01	3.899E-02

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	5.202E-01	3.508E+00	4.020E+00	4.317E+00	4.316E+00	2.403E-01	3.059E-01	1.035E-01	4.637E-01
Th-228	9.542E-01	1.110E+01	1.221E+01	1.278E+01	1.277E+01	3.865E+00	1.729E+00	6.301E-01	1.262E+00
Th-232	1.174E+01	1.412E+01	2.657E+01	3.342E+01	3.342E+01	1.493E+01	5.637E+00	7.798E+00	1.560E+01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+03 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	8.578E-04	8.578E-04	3.936E-10	8.000E-03	2.656E-05
Th-228	8.736E-04	8.736E-04	4.008E-10	1.309E-02	4.346E-05
Th-232	8.094E-04	8.094E-04	3.713E-10	1.472E-01	4.888E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+03 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	8.046E-03	3.753E-02	4.565E-02	5.027E-02	5.025E-02	3.400E-03	4.111E-03	1.551E-03	7.076E-03
Th-228	1.309E-02	1.170E-01	1.319E-01	1.396E-01	1.396E-01	4.786E-02	2.009E-02	8.643E-03	1.731E-02
Th-232	1.472E-01	1.560E-01	3.120E-01	3.981E-01	3.979E-01	1.856E-01	6.881E-02	9.776E-02	1.955E-01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

RESRAD REPORT – RESIDENT COLONIE SITE SPECIFIC FOR COPPER WITH COVER

Part I: Mixture Sums and Single Radionuclide Guidelines

Summary : Resident Colonie Site Specific for Copper with Cover

File : RESCUCOV.RAD

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Dose Conversion Factor (and Related) Parameter Summary
File: 02935427.LIB

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ra-228+D	5.080E-03	5.080E-03	DCF2(1)
B-1	Th-228+D	3.450E-01	3.450E-01	DCF2(2)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(3)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ra-228+D	1.440E-03	1.440E-03	DCF3(1)
D-1	Th-228+D	8.080E-04	8.080E-04	DCF3(2)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(3)
D-34	Food transfer factors:			
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.300E-01	1.000E-03	RTF(2,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-02	1.000E-04	RTF(2,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	5.000E-06	RTF(2,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.300E-01	1.000E-03	RTF(3,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-02	1.000E-04	RTF(3,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	5.000E-06	RTF(3,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(1,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(1,2)
D-5				
D-5	Th-228+D , fish	2.000E+02	1.000E+02	BIOFAC(2,1)
D-5	Th-228+D , crustacea and mollusks	4.000E+02	5.000E+02	BIOFAC(2,2)
D-5				
D-5	Th-232 , fish	2.000E+02	1.000E+02	BIOFAC(3,1)
D-5	Th-232 , crustacea and mollusks	4.000E+02	5.000E+02	BIOFAC(3,2)

Summary : Resident Colonie Site Specific for Copper with Cover
File : RESCUCOV.RAD

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.400E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.000E+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)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	5.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Th-232	1.000E+00	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(3)
R013	Cover depth (m)	6.096E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.431E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.150E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	3.500E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.990E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.830E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	3.120E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	3.500E+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)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	2.200E+01	6.000E+04	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	2.200E+01	6.000E+04	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.119E-03	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.151E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Th-229				
R016	Contaminated zone (cm**3/g)	2.700E+02	6.000E+04	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	2.700E+02	6.000E+04	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.835E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.571E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.101E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.120E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.140E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	0.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	2.500E-01	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	2.500E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	1.230E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	0.000E+00	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	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	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

Summary : Resident Colonie Site Specific for Copper with Cover

File : RESCUCOV.RAD

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	2400.00 square meters	Th-232	1.000E+00
Thickness:	2.00 meters		
Cover Depth:	0.61 meters		

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 25 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	3.861E+00	3.950E+00	4.165E+00	4.780E+00	5.003E+00	4.668E+00	3.759E+00	1.391E+00	2.032E-02
M(t):	1.544E-01	1.580E-01	1.666E-01	1.912E-01	2.001E-01	1.867E-01	1.503E-01	5.564E-02	8.127E-04

Maximum TDOSE(t): 5.060E+00 mrem/yr at t = 21.98 ± 0.04 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 = 2.198E+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.
Th-232	8.024E-03	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	5.052E+00	0.9984	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	8.024E-03	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	5.052E+00	0.9984	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 2.198E+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.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.060E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.060E+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.
Th-232	1.126E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.860E+00	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.126E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.860E+00	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.861E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.861E+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.
Th-232	4.617E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	3.949E+00	0.9999	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	4.617E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	3.949E+00	0.9999	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.950E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.950E+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+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.
Th-232	1.474E-03	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	4.164E+00	0.9996	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.474E-03	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	4.164E+00	0.9996	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.165E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.165E+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.
Th-232	5.035E-03	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	4.775E+00	0.9989	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.035E-03	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	4.775E+00	0.9989	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.780E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.780E+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.
Th-232	8.879E-03	0.0018	0.000E+00	0.0000	0.000E+00	0.0000	4.995E+00	0.9982	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	8.879E-03	0.0018	0.000E+00	0.0000	0.000E+00	0.0000	4.995E+00	0.9982	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.003E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.003E+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+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.
Th-232	9.995E-03	0.0021	0.000E+00	0.0000	0.000E+00	0.0000	4.658E+00	0.9979	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	9.995E-03	0.0021	0.000E+00	0.0000	0.000E+00	0.0000	4.658E+00	0.9979	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.668E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.668E+00	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Colonie Site Specific for Copper with Cover

File : RESCUCOV.RAD

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

As mrem/yr and fraction of Total Dose At t = 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.223E-02	0.0033	0.000E+00	0.0000	0.000E+00	0.0000	3.746E+00	0.9967	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.223E-02	0.0033	0.000E+00	0.0000	0.000E+00	0.0000	3.746E+00	0.9967	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.759E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.759E+00	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Colonie Site Specific for Copper with Cover
File : RESCUCOV.RAD

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	2.725E-02	0.0196	0.000E+00	0.0000	0.000E+00	0.0000	1.364E+00	0.9804	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.725E-02	0.0196	0.000E+00	0.0000	0.000E+00	0.0000	1.364E+00	0.9804	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.391E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.391E+00	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Colonie Site Specific for Copper with Cover

File : RESCUCOV.RAD

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	6.027E-03	0.2966	3.255E-06	0.0002	0.000E+00	0.0000	1.423E-02	0.7004	0.000E+00	0.0000	0.000E+00	0.0000	5.794E-05	0.0029
Total	6.027E-03	0.2966	3.255E-06	0.0002	0.000E+00	0.0000	1.423E-02	0.7004	0.000E+00	0.0000	0.000E+00	0.0000	5.794E-05	0.0029

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.032E-02	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.032E-02	1.0000

*Sum of all water independent and dependent pathways.

Summary : Resident Colonie Site Specific for Copper with Cover

File : RESCUCOV.RAD

Dose/Source Ratios Summed Over All Pathways

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	3.812E+00	3.798E+00	3.770E+00	3.673E+00	3.397E+00	3.130E+00	2.514E+00	9.151E-01	9.582E-03
Th-232	Ra-228	1.000E+00	0.000E+00	1.078E-01	2.185E-01	4.464E-01	5.723E-01	5.427E-01	4.382E-01	1.653E-01	3.870E-03
Th-232	Th-228	1.000E+00	0.000E+00	4.366E-02	1.764E-01	6.612E-01	1.034E+00	9.952E-01	8.065E-01	3.105E-01	6.865E-03
Th-232	∑DSR(j)		3.812E+00	3.950E+00	4.165E+00	4.780E+00	5.003E+00	4.668E+00	3.759E+00	1.391E+00	2.032E-02

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).

The DSR includes contributions from associated (half-life ≤ 0.5 yr) daughters.

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

Basic Radiation Dose Limit = 25 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	6.476E+00	6.329E+00	6.002E+00	5.230E+00	4.997E+00	5.356E+00	6.651E+00	1.797E+01	1.230E+03

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 = 21.98 ± 0.04 years

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Th-232	1.000E+00	21.98 ± 0.04	5.060E+00	4.941E+00	5.060E+00	4.941E+00

Summary : Resident Colonie Site Specific for Copper with Cover

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Individual Nuclide Dose Summed Over All Pathways

Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr								
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	3.812E+00	3.798E+00	3.770E+00	3.673E+00	3.397E+00	3.130E+00	2.514E+00	9.151E-01	9.582E-03
Ra-228	Th-232	1.000E+00	4.120E-02	1.078E-01	2.185E-01	4.464E-01	5.723E-01	5.427E-01	4.382E-01	1.653E-01	3.870E-03
Th-228	Th-232	1.000E+00	6.860E-03	4.366E-02	1.764E-01	6.612E-01	1.034E+00	9.952E-01	8.065E-01	3.105E-01	6.865E-03

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

Individual Nuclide Soil Concentration

Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g								
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	1.000E+00	9.929E-01	9.789E-01	9.313E-01	8.077E-01	7.005E-01	4.907E-01	1.182E-01	8.094E-04
Ra-228	Th-232	1.000E+00	0.000E+00	1.131E-01	2.999E-01	6.705E-01	8.278E-01	7.399E-01	5.200E-01	1.252E-01	8.578E-04
Th-228	Th-232	1.000E+00	0.000E+00	1.859E-02	1.232E-01	5.448E-01	8.295E-01	7.523E-01	5.296E-01	1.275E-01	8.736E-04

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

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RESRAD REPORT – RESIDENT COLONIE SITE SPECIFIC FOR COPPER WITH COVER

Part IV: Concentration of Radionuclides

Concent : Resident Colonie Site Specific for Copper with Cover
File : RESCUCOV.RAD

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Concentration of radionuclides in environmental media
at t = 0.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 0.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	0.000E+00	4.195E+01	4.195E+01	4.195E+01	4.195E+01	1.137E+01	5.306E+00	0.000E+00	0.000E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	1.131E-01	0.000E+00	0.000E+00	2.346E-04	7.789E-07
Th-228	1.859E-02	0.000E+00	0.000E+00	5.015E-05	1.665E-07
Th-232	9.929E-01	0.000E+00	0.000E+00	9.135E-02	3.033E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	2.633E-04	1.598E+00	1.475E+00	1.390E+00	1.461E+00	1.122E-01	9.417E-02	1.745E-04	4.610E-04
Th-228	4.994E-05	7.388E-01	7.793E-01	7.052E-01	7.786E-01	1.888E-01	9.850E-02	3.192E-05	6.463E-05
Th-232	9.109E-02	4.180E+01	4.179E+01	4.180E+01	4.179E+01	1.137E+01	5.298E+00	5.944E-02	1.189E-01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	2.999E-01	0.000E+00	0.000E+00	1.946E-03	6.460E-06
Th-228	1.232E-01	0.000E+00	0.000E+00	1.072E-03	3.559E-06
Th-232	9.789E-01	0.000E+00	0.000E+00	2.722E-01	9.037E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	2.032E-03	4.043E+00	3.920E+00	3.852E+00	3.908E+00	1.786E-01	2.490E-01	7.325E-04	2.420E-03
Th-228	1.070E-03	5.102E+00	5.214E+00	5.074E+00	5.215E+00	1.351E+00	6.595E-01	6.979E-04	1.402E-03
Th-232	2.719E-01	4.149E+01	4.148E+01	4.149E+01	4.148E+01	1.138E+01	5.280E+00	1.795E-01	3.591E-01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	6.705E-01	0.000E+00	0.000E+00	1.661E-02	5.513E-05
Th-228	5.448E-01	0.000E+00	0.000E+00	1.970E-02	6.539E-05
Th-232	9.313E-01	0.000E+00	0.000E+00	8.862E-01	2.942E-03

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	1.689E-02	9.080E+00	8.961E+00	8.928E+00	8.951E+00	3.161E-01	5.687E-01	4.096E-03	1.642E-02
Th-228	1.968E-02	2.336E+01	2.362E+01	2.353E+01	2.364E+01	6.266E+00	2.990E+00	1.296E-02	2.597E-02
Th-232	8.860E-01	4.042E+01	4.041E+01	4.042E+01	4.041E+01	1.139E+01	5.218E+00	5.873E-01	1.175E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	8.278E-01	0.000E+00	0.000E+00	8.217E-02	2.728E-04
Th-228	8.295E-01	0.000E+00	0.000E+00	1.353E-01	4.493E-04
Th-232	8.077E-01	0.000E+00	0.000E+00	2.488E+00	8.260E-03

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	8.296E-02	1.191E+01	1.180E+01	1.179E+01	1.179E+01	3.963E-01	7.520E-01	1.741E-02	7.561E-02
Th-228	1.353E-01	3.802E+01	3.836E+01	3.839E+01	3.839E+01	1.027E+01	4.868E+00	8.926E-02	1.788E-01
Th-232	2.488E+00	3.739E+01	3.738E+01	3.739E+01	3.738E+01	1.137E+01	5.027E+00	1.651E+00	3.302E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 5.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	7.399E-01	0.000E+00	0.000E+00	1.471E-01	4.883E-04
Th-228	7.523E-01	0.000E+00	0.000E+00	2.570E-01	8.532E-04
Th-232	7.005E-01	0.000E+00	0.000E+00	3.887E+00	1.290E-02

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 5.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	1.483E-01	1.130E+01	1.120E+01	1.120E+01	1.119E+01	3.830E-01	7.183E-01	3.030E-02	1.337E-01
Th-228	2.569E-01	3.664E+01	3.696E+01	3.700E+01	3.699E+01	9.962E+00	4.706E+00	1.696E-01	3.397E-01
Th-232	3.886E+00	3.445E+01	3.444E+01	3.445E+01	3.444E+01	1.128E+01	4.823E+00	2.580E+00	5.159E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	5.200E-01	0.000E+00	0.000E+00	2.773E-01	9.205E-04
Th-228	5.296E-01	0.000E+00	0.000E+00	5.026E-01	1.668E-03
Th-232	4.907E-01	0.000E+00	0.000E+00	6.655E+00	2.209E-02

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	2.794E-01	9.111E+00	9.030E+00	9.026E+00	9.024E+00	3.281E-01	5.887E-01	5.611E-02	2.499E-01
Th-228	5.023E-01	2.958E+01	2.984E+01	2.987E+01	2.987E+01	8.188E+00	3.835E+00	3.317E-01	6.643E-01
Th-232	6.655E+00	2.768E+01	2.767E+01	2.768E+01	2.767E+01	1.083E+01	4.299E+00	4.418E+00	8.836E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	1.252E-01	0.000E+00	0.000E+00	5.165E-01	1.715E-03
Th-228	1.275E-01	0.000E+00	0.000E+00	9.546E-01	3.169E-03
Th-232	1.182E-01	0.000E+00	0.000E+00	1.174E+01	3.899E-02

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	5.202E-01	3.318E+00	3.288E+00	3.287E+00	3.286E+00	1.709E-01	2.399E-01	1.035E-01	4.637E-01
Th-228	9.542E-01	1.077E+01	1.087E+01	1.088E+01	1.088E+01	3.361E+00	1.489E+00	6.301E-01	1.262E+00
Th-232	1.174E+01	1.008E+01	1.008E+01	1.008E+01	1.008E+01	8.603E+00	2.684E+00	7.798E+00	1.560E+01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+03 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	8.578E-04	8.578E-04	3.936E-10	8.000E-03	2.656E-05
Th-228	8.736E-04	8.736E-04	4.008E-10	1.309E-02	4.346E-05
Th-232	8.094E-04	8.094E-04	3.713E-10	1.472E-01	4.888E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+03 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	8.046E-03	3.465E-02	3.434E-02	3.433E-02	3.432E-02	2.449E-03	3.092E-03	1.551E-03	7.076E-03
Th-228	1.309E-02	1.125E-01	1.135E-01	1.136E-01	1.136E-01	4.093E-02	1.680E-02	8.643E-03	1.731E-02
Th-232	1.472E-01	1.053E-01	1.052E-01	1.053E-01	1.052E-01	1.062E-01	3.179E-02	9.776E-02	1.955E-01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

RESRAD REPORT – INDUSTRIAL COLONIE SITE SPECIFIC FOR COPPER WITH COVER

Part I: Mixture Sums and Single Radionuclide Guidelines

Summary : Industrial Colonie Site Specific for Copper with Cover

File : INDCUCOV.RAD

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Summary : Industrial Colonie Site Specific for Copper with Cover

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Dose Conversion Factor (and Related) Parameter Summary

File: 02935427.LIB

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B-1	Th-232	1.640E+00	1.640E+00	DCF2(3)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ra-228+D	1.440E-03	1.440E-03	DCF3(1)
D-1	Th-228+D	8.080E-04	8.080E-04	DCF3(2)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(3)
D-34	Food transfer factors:			
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.300E-01	1.000E-03	RTF(2,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-02	1.000E-04	RTF(2,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	5.000E-06	RTF(2,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.300E-01	1.000E-03	RTF(3,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-02	1.000E-04	RTF(3,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	5.000E-06	RTF(3,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(1,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(1,2)
D-5				
D-5	Th-228+D , fish	2.000E+02	1.000E+02	BIOFAC(2,1)
D-5	Th-228+D , crustacea and mollusks	4.000E+02	5.000E+02	BIOFAC(2,2)
D-5				
D-5	Th-232 , fish	2.000E+02	1.000E+02	BIOFAC(3,1)
D-5	Th-232 , crustacea and mollusks	4.000E+02	5.000E+02	BIOFAC(3,2)

Summary : Industrial Colonie Site Specific for Copper with Cover

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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)	2.400E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	5.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Th-232	1.000E+00	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(3)
R013	Cover depth (m)	6.096E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.431E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.150E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	3.500E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.990E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.830E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	2.200E+01	6.000E+04	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.119E-03	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.151E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daugnter Th-228				
R016	Contaminated zone (cm**3/g)	2.700E+02	6.000E+04	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.835E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	1.426E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.426E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	0.000E+00	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS

Summary : Industrial Colonie Site Specific for Copper with Cover

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	513	---	---	KYMAX

Summary of Pathway Selections

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

Summary : Industrial Colonie Site Specific for Copper with Cover
File : INDCUCOV.RAD

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	2400.00 square meters	Th-232	1.000E+00
Thickness:	2.00 meters		
Cover Depth:	0.61 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 25 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	5.274E-05	2.162E-04	6.904E-04	2.358E-03	4.159E-03	4.681E-03	5.726E-03	1.276E-02	2.846E-03
M(t):	2.110E-06	8.649E-06	2.762E-05	9.432E-05	1.663E-04	1.872E-04	2.290E-04	5.106E-04	1.138E-04

Maximum TDOSE(t): 4.666E-02 mrem/yr at t = 608 ± 1 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 = 6.081E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	4.628E-02	0.9919	2.818E-05	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.484E-04	0.0075
Total	4.628E-02	0.9919	2.818E-05	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.484E-04	0.0075

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 6.081E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.666E-02	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.666E-02	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.
Th-232	5.274E-05	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.274E-05	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.274E-05	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.274E-05	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	2.162E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.162E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 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.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.162E-04	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.162E-04	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	6.904E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	6.904E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.904E-04	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.904E-04	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Innalation		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.
Th-232	2.358E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.358E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 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.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.358E-03	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.358E-03	1.0000

*Sum of all water independent and dependent pathways.

Summary : Industrial Colonie Site Specific for Copper with Cover

File : INDCUCOV.RAD

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	4.159E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	4.159E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 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.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.159E-03	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.159E-03	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
Th-232	4.681E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	4.681E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.681E-03	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.681E-03	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	5.726E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.726E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.726E-03	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.726E-03	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	1.276E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.276E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.276E-02	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.276E-02	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	2.823E-03	0.9918	1.742E-06	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.154E-05	0.0076
Total	2.823E-03	0.9918	1.742E-06	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.154E-05	0.0076

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.846E-03	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.846E-03	1.0000

*Sum of all water independent and dependent pathways.

Dose/Source Ratios Summed Over All Pathways

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	1.252E-12	1.281E-12	1.340E-12	1.570E-12	2.470E-12	3.885E-12	1.205E-11	1.117E-09	1.297E-05
Th-232	Ra-228	1.000E+00	0.000E+00	9.502E-05	2.015E-04	4.447E-04	6.897E-04	7.917E-04	1.044E-03	3.121E-03	1.035E-03
Th-232	Th-228	1.000E+00	0.000E+00	1.212E-04	4.890E-04	1.913E-03	3.469E-03	3.889E-03	4.682E-03	9.644E-03	1.798E-03
Th-232	∑DSR(j)		1.252E-12	2.162E-04	6.904E-04	2.358E-03	4.159E-03	4.681E-03	5.726E-03	1.276E-02	2.846E-03

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

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

Basic Radiation Dose Limit = 25 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	*1.096E+05	*1.096E+05	3.621E+04	1.060E+04	6.012E+03	5.341E+03	4.366E+03	1.959E+03	8.784E+03

*At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 608 ± 1 years

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Th-232	1.000E+00	608 ± 1	4.666E-02	5.358E+02	4.666E-02	5.358E+02

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

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr								
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	1.252E-12	1.281E-12	1.340E-12	1.570E-12	2.470E-12	3.885E-12	1.205E-11	1.117E-09	1.297E-05
Ra-228	Th-232	1.000E+00	3.312E-05	9.502E-05	2.015E-04	4.447E-04	6.897E-04	7.917E-04	1.044E-03	3.121E-03	1.035E-03
Th-228	Th-232	1.000E+00	1.962E-05	1.212E-04	4.890E-04	1.913E-03	3.469E-03	3.889E-03	4.682E-03	9.644E-03	1.798E-03

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

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g								
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	1.000E+00	9.929E-01	9.789E-01	9.313E-01	8.077E-01	7.005E-01	4.907E-01	1.182E-01	8.094E-04
Ra-228	Th-232	1.000E+00	0.000E+00	1.131E-01	2.999E-01	6.705E-01	8.278E-01	7.399E-01	5.200E-01	1.252E-01	8.578E-04
Th-228	Th-232	1.000E+00	0.000E+00	1.859E-02	1.232E-01	5.448E-01	8.295E-01	7.523E-01	5.296E-01	1.275E-01	8.736E-04

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

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Part IV: Concentration of Radionuclides

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Part IV: Concentration of Radionuclides

Concentration of radionuclides in different media
Time= 0.000E+00 2
Time= 1.000E+00 3
Time= 3.000E+00 4
Time= 1.000E+01 5
Time= 3.000E+01 6
Time= 5.000E+01 7
Time= 1.000E+02 8
Time= 3.000E+02 9
Time= 1.000E+03 10

Concentration of radionuclides in environmental media
at t = 0.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 0.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	0.000E+00	4.195E+01	4.195E+01	4.195E+01	4.195E+01	1.137E+01	5.306E+00	0.000E+00	0.000E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	1.131E-01	0.000E+00	0.000E+00	2.346E-04	7.789E-07
Th-228	1.859E-02	0.000E+00	0.000E+00	5.015E-05	1.665E-07
Th-232	9.929E-01	0.000E+00	0.000E+00	9.135E-02	3.033E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	2.633E-04	1.599E+00	1.475E+00	1.390E+00	1.462E+00	1.125E-01	9.421E-02	1.745E-04	4.610E-04
Th-228	4.994E-05	7.388E-01	7.794E-01	7.053E-01	7.787E-01	1.889E-01	9.851E-02	3.192E-05	6.463E-05
Th-232	9.109E-02	4.183E+01	4.192E+01	4.197E+01	4.197E+01	1.142E+01	5.321E+00	5.944E-02	1.189E-01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	2.999E-01	0.000E+00	0.000E+00	1.946E-03	6.460E-06
Th-228	1.232E-01	0.000E+00	0.000E+00	1.072E-03	3.559E-06
Th-232	9.789E-01	0.000E+00	0.000E+00	2.722E-01	9.037E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	2.032E-03	4.044E+00	3.923E+00	3.856E+00	3.912E+00	1.797E-01	2.492E-01	7.325E-04	2.420E-03
Th-228	1.070E-03	5.103E+00	5.216E+00	5.076E+00	5.217E+00	1.352E+00	6.597E-01	6.979E-04	1.402E-03
Th-232	2.719E-01	4.158E+01	4.187E+01	4.202E+01	4.202E+01	1.152E+01	5.349E+00	1.795E-01	3.591E-01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	6.705E-01	0.000E+00	0.000E+00	1.661E-02	5.513E-05
Th-228	5.448E-01	0.000E+00	0.000E+00	1.970E-02	6.539E-05
Th-232	9.313E-01	0.000E+00	0.000E+00	8.862E-01	2.942E-03

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	1.689E-02	9.087E+00	8.985E+00	8.961E+00	8.984E+00	3.202E-01	5.709E-01	4.096E-03	1.642E-02
Th-228	1.968E-02	2.337E+01	2.365E+01	2.357E+01	2.368E+01	6.277E+00	2.995E+00	1.296E-02	2.597E-02
Th-232	8.860E-01	4.072E+01	4.165E+01	4.217E+01	4.217E+01	1.187E+01	5.441E+00	5.873E-01	1.175E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	8.278E-01	0.000E+00	0.000E+00	8.217E-02	2.728E-04
Th-228	8.295E-01	0.000E+00	0.000E+00	1.353E-01	4.493E-04
Th-232	8.077E-01	0.000E+00	0.000E+00	2.488E+00	8.260E-03

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	8.296E-02	1.194E+01	1.191E+01	1.195E+01	1.195E+01	4.095E-01	7.625E-01	1.741E-02	7.561E-02
Th-228	1.353E-01	3.807E+01	3.855E+01	3.865E+01	3.866E+01	1.034E+01	4.902E+00	8.926E-02	1.788E-01
Th-232	2.488E+00	3.824E+01	4.087E+01	4.233E+01	4.233E+01	1.271E+01	5.653E+00	1.651E+00	3.302E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 5.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	7.399E-01	0.000E+00	0.000E+00	1.471E-01	4.883E-04
Th-228	7.523E-01	0.000E+00	0.000E+00	2.570E-01	8.532E-04
Th-232	7.005E-01	0.000E+00	0.000E+00	3.887E+00	1.290E-02

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 5.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	1.483E-01	1.136E+01	1.141E+01	1.149E+01	1.149E+01	4.046E-01	7.371E-01	3.030E-02	1.337E-01
Th-228	2.569E-01	3.673E+01	3.732E+01	3.751E+01	3.750E+01	1.010E+01	4.771E+00	1.696E-01	3.397E-01
Th-232	3.886E+00	3.579E+01	3.990E+01	4.217E+01	4.217E+01	1.337E+01	5.801E+00	2.580E+00	5.159E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	5.200E-01	0.000E+00	0.000E+00	2.773E-01	9.205E-04
Th-228	5.296E-01	0.000E+00	0.000E+00	5.026E-01	1.668E-03
Th-232	4.907E-01	0.000E+00	0.000E+00	6.655E+00	2.209E-02

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	2.794E-01	9.213E+00	9.423E+00	9.578E+00	9.577E+00	3.665E-01	6.242E-01	5.611E-02	2.499E-01
Th-228	5.023E-01	2.975E+01	3.055E+01	3.087E+01	3.086E+01	8.454E+00	3.961E+00	3.317E-01	6.643E-01
Th-232	6.655E+00	2.997E+01	3.702E+01	4.090E+01	4.090E+01	1.441E+01	5.972E+00	4.418E+00	8.836E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	1.252E-01	0.000E+00	0.000E+00	5.165E-01	1.715E-03
Th-228	1.275E-01	0.000E+00	0.000E+00	9.546E-01	3.169E-03
Th-232	1.182E-01	0.000E+00	0.000E+00	1.174E+01	3.899E-02

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	5.202E-01	3.508E+00	4.020E+00	4.317E+00	4.316E+00	2.403E-01	3.059E-01	1.035E-01	4.637E-01
Th-228	9.542E-01	1.110E+01	1.221E+01	1.278E+01	1.277E+01	3.865E+00	1.729E+00	6.301E-01	1.262E+00
Th-232	1.174E+01	1.412E+01	2.657E+01	3.342E+01	3.342E+01	1.493E+01	5.637E+00	7.798E+00	1.560E+01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+03 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ra-228	8.578E-04	8.578E-04	3.936E-10	8.000E-03	2.656E-05
Th-228	8.736E-04	8.736E-04	4.008E-10	1.309E-02	4.346E-05
Th-232	8.094E-04	8.094E-04	3.713E-10	1.472E-01	4.888E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+03 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ra-228	8.046E-03	3.753E-02	4.565E-02	5.027E-02	5.025E-02	3.400E-03	4.111E-03	1.551E-03	7.076E-03
Th-228	1.309E-02	1.170E-01	1.319E-01	1.396E-01	1.396E-01	4.786E-02	2.009E-02	8.643E-03	1.731E-02
Th-232	1.472E-01	1.560E-01	3.120E-01	3.981E-01	3.979E-01	1.856E-01	6.881E-02	9.776E-02	1.955E-01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters i.e. using parameters appearing in the input screen when the pathways are active.

APPENDIX F:

Soil Cleanup Goals for Copper

Appendix F
Soil Cleanup Goals for Copper

F.1 Approach

Soil cleanup goal calculations for copper were calculated for the Colonie site. Copper was identified as a chemical of potential concern in soil in the 1995 EE/CA and in the screening process performed as part of this Technical Memorandum. Ecological cleanup goals for copper were not warranted as stated earlier in the text.

Algorithms used for soil cleanup goals were developed following guidance presented in the *Soil Screening Guidance* (EPA, 1996) and *Risk Assessment Guidance for Superfund* (RAGS; EPA, 1989), as modified with available site-specific exposure assumptions and updated toxicity values. Additional methodology for the ingestion of vegetables was obtained from the *Human Health Risk Assessment Protocol for Hazardous Waste Combustors* (EPA, 1998).

F.2 Exposure Scenarios and General Assumptions

Three on-site exposure scenarios were evaluated – the Resident Farmer, the Urban Resident, and the Industrial Worker. These have been described in detail in other parts of the Technical Memorandum text. Key assumptions and algorithms are provided in the subsections and tables below.

Noncancer cleanup goals were based on the 1 to 6 year old child since the child represents the most sensitive receptor. The soil cleanup goals were calculated for noncancer effects at a target hazard quotient (THQ) of 1.0. Selection of this THQ was based on the results presented in Table 3-2 in the text of the Technical Memorandum.

For indirect exposure pathway cleanup goals for the Resident Farmer and Urban Resident, aboveground and belowground vegetable ingestion was evaluated. Vegetable ingestion was not evaluated for the Industrial Worker scenario.

F.3 Algorithms and Specific Input Assumptions

F.3.1 Resident Farmer and Urban Resident Scenarios

F 3.1.1 Soil Ingestion

Table F.1 shows the soil ingestion algorithm used. Soil ingestion rates were 200 mg/day and 100 mg/day for the farmer child and adult, respectively (EPA, 1991), and for the urban resident, were 100 mg/day and 50 mg/day, respectively (EPA, 1997a). Higher values were used for the farmer scenario as it was assumed there would be greater contact with soil during a typical day. Body weights and exposure durations were the conventional default values recommended by EPA (EPA, 1991).

F.3.1.2 Dermal Contact

Table F.2 presents the algorithms and inputs for calculating noncancerc cleanup goals based on dermal contact with soil for the children of the Resident farmer and Urban Resident. The skin absorption factor for inorganics was assumed to be 1 percent. Surface areas for both the Resident Farmer and Urban Resident were based on the 50th average for the head, hands, forearms, lower legs and feet for the child (EPA, 1997a). The soil-to-skin adherence factor was weighted by body part surface area and activity using the following equation:

$$Weighted\ AF = [(SA_a * AF_a) + (SA_b * AF_b) + ... + (SA_i * AF_i)] / [SA_a + SA_b + ... + SA_i]$$

Where:

SA_i = Surface area for body part "I," cm^2.
AF_i = Soil-to-skin adherence factor for body part "I," mg/cm^2–day.

For the child, the activity was assumed to be that of an "Indoor Kid No. 2" (EPA, 1997a). Surface areas and the adherence factor values are shown in Table F.2.

F.3.1.3 Inhalation

Table F.3 shows the algorithms and inputs for noncancer cleanup goals for inhalation of dust in the child of the Resident Farmer and Urban Resident. The particulate emission factor was based on the air-dispersion characteristics of Hartford, CT, which was the closest zone to the Colonie site (EPA, 1996). The inhalation rate for the child was obtained from the *Exposure Factors Handbook* (EFH) (Table 5-23; EPA, 1997a) and was assumed to be the same for both the farmer and resident. The child inhalation rate was based on chronic exposure of young children ages 1 through 8 years. .

F.3.1.4 Aboveground and Belowground Vegetable Ingestion

Tables F.4 and F.5 present the noncarcer cleanup goal algorithms and inputs and the age-adjusted factors for aboveground and belowground vegetable consumption, respectively. The algorithms and inputs were developed following guidance developed for assessing indirect exposure from combustion facilities (EPA, 1998). Additional references are cited where appropriate.

Vegetable Ingestion Rates

The same aboveground and belowground vegetable rates were used for the child of both the Resident Farmer and Urban Resident. This value was indirectly modified to reflect fraction ingested of homegrown produce as discussed below. The ingestion rates were based on the 1998 combustor guidance (EPA, 1998). The ingestion rate of aboveground vegetables was based on the sum of the exposed ingestion rate for the child (0.00042 kg/kg-d) and the protected rate for the child (0.00077 kg/kg-d) (Table C.1.2; EPA, 1998). The total aboveground vegetable ingestion rate was calculated as 0.00119 kg/kg-d. This

value was then multiplied times the child body weight of 15 kg and an appropriate conversion factor to yield 7.9 g/d (DW). The belowground ingestion rate was based on the belowground produce rate of 0.00022 kg/kg-d (Table C.1.2; EPA, 1998). This value was then multiplied times the child body weight of 15 kg and an appropriate conversion factor to yield 3.3 g/d DW.

Fraction Ingested

For the child of the Resident Farmer, it was assumed that all produce grown onsite was ingested throughout the year at the calculated ingestion rate. Therefore, the fraction ingested (FI) was 100 percent, as recommended in the combustor guidance (EPA, 1998).

For the child of the Urban Resident, an FI of 0.075 (7.5 percent) was calculated. This was based on extrapolation of home-produced food consumption data from the EFH (EPA, 1997a) as follows:

- Equation 13-2 was rearranged and reduced to yield the equation N_C/N_T. N_C is equal to the weighted number of individuals consuming homegrown produce based on the 1987-88 Nationwide Food Consumption Survey (NFCS) (EPA, 1997a). N_T is equal to the weighted total number of respondents consuming produce (NCFS, 1987-88), regardless of the source (i.e., homegrown, store-bought, or other).

- NC and NT values were based on data from the Northeast region of the U.S., which most closely approximates dietary habits of people in the Colonie site area. NT (total) was obtained from Table 13-4 (EPA, 1997a). The NC (total) value for fruits (NC) was obtained from Table 13-9, and for vegetables was obtained from Table 13-4.

Calculations yielded an FI of 0.31 for homegrown fruit consumption, and an FI of 0.119 for homegrown vegetable consumption. Because NCFS vegetable data could include both aboveground and belowground vegetables, the FI values for fruits and vegetables were averaged to yield an FI of 0.075.

Plant Uptake From Soil

Copper uptake into plants (stems/foliage) from soil was based on guidance from U.S. DOE (DOE, 1998). This source was used because the uptake mechanism for copper into plants may have rate-limitingproperties for which the Baes uptake factor (discussed below) may not be appropriate. The uptake values cited in the DOE guidance are not recommended for use in fruits or root vegetables. Fruits and other vegetables were based on reports from Baes et al (1984).

This approach was taken because of the difficulty in distinguishing the different types of fruits and vegetables in the standard EPA algorithms used in this report (i.e., some aboveground vegetables may be fruits such as tomatoes). Therefore, the uptake factor from the DOE guidance (0.123 kg soil per kg plant [DW]) was used for aboveground

plants (see p. 24, Table 9; DOE, 1998). The Baes factor of 0.25 was used for belowground vegetables.

F.3.2 Industrial Worker Scenario

F.3.2.1 Soil Ingestion

Table F.6 shows the algorithm and inputs for the calculation of noncancer cleanup goals for the Industrial Worker based on soil ingestion. The exposure frequency was adjusted to reflect that the worker put in 60-hours per week for a standard 50-week work year (i.e., the 375 days per year is an artifact of the calculation). Soil ingestion rate for the industrial worker was 50 mg per day (EPA, 1991).

F.3.2.2 Dermal Contact

The algorithm and inputs for calculating cleanup goals through dermal absorption from soil for noncancer effects are shown in Table F.7. Exposed surface area was the average of the 50th percentile surface areas for the male and female (EPA, 1997a) and represented the head, hands, forearms, lower legs and feet. The soil-to-skin adherence factor was surface-area and body-part weighted according to the equation mentioned earlier in the discussion.

F.3.2.3 Inhalation

Table F.8 presents the algorithm and inputs for dust inhalation cleanup goals based on noncancer and carcinogenicity effects, respectively, for the worker. The inhalation rate represents the average of the male and female adult based on long-term exposure (Table 5-23; EPA, 1997a).

F.3.3 Integrated Remedial Goals

Table F.9 presents the algorithm that was used to integrate cleanup goals for each scenario based on the combination of all exposure pathways (Rosenblatt *et al.*, 1982).

F.4 TOXICITY ASSESSMENT

The oral noncancer reference dose (RfD) (mg/kg-d) was obtained from the *Health Effects Assessment Summary Tables* (HEAST; EPA, 1997b). This value was 4E-02 mg/kg-d). There is no verified or provisional inhalation RfD for copper. Route-to-route extrapolation was not employed.

F.5 COPPER CLEANUP GOALS AND DISCUSSION

F.5.1 Resident Farmer

Tables F.10 through F.14 present the results for the Resident Farmer by exposure pathway for cancer and/or noncancer effects. Table F.15 summarizes the findings for all

exposure pathways evaluated for copper indicating that for the Resident Farmer remedial goal based on noncancer effects was 194 mg/kg. The noncancer effects through vegetable ingestion drove the cleanup goals.

F.5.2 Urban Resident

Tables F.10 through F.14 also present the results for each exposure pathway for copper exposure for the Urban Resident. Table F.15 is a summary of the integrated cleanup goals. The noncancer cleanup goal for copper was calculated as 1,912 mg/kg). As with the Resident Farmer scenario, vegetable ingestion had the greatest impact for copper.

F.5.3 Industrial Worker

Table F.16 presents the cleanup goals by exposure pathway for the Industrial Worker. The integrated cleanup goal for copper was 51,150 ppm. Copper was driven by soil ingestion for the Industrial Worker.

F.6 REFERENCES

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Table F.1

Model for Copper Noncancer Remedial Goal for Soil Ingestion
Resident Farmer Child and Urban Resident Child
Colonie Site

$$RG\,(mg/kg) = \frac{THQ \times BW \times AT_{nc}}{FI \times EF \times ED \times IRS \times 1/RfD_o \times CF}$$

Exposure Scenario: Resident Farmer Child

Parameter	Definition	Value
THQ	Target hazard quotient.	1.0
BW	Body weight (kg).	15
AT_{nc}	Averaging time – noncancer (days).	2,190
FI	Fraction of contaminated soil ingested (unitless).	1.0
EF	Exposure frequency (days/year).	350
ED	Exposure duration (years).	6
IRS	Soil ingestion rate (mg/day).	200
RfD_o	Oral reference dose (mg/kg-day).	4.00E-02
CF	Conversion factor (kg/mg).	1.00E-06

Exposure Scenario: Urban Resident Child

Parameter	Definition	Value
THQ	Target hazard quotient.	1.0
BW	Body weight (kg).	15
AT_{nc}	Averaging time – noncancer (days).	2,190
FI	Fraction of contaminated soil ingested (unitless).	1.0
EF	Exposure frequency (days/year).	350
ED	Exposure duration (years).	6
IRS	Soil ingestion rate (mg/day).	100
RfD_o	Oral reference dose (mg/kg-day).	4.00E-02
CF	Conversion factor (kg/mg).	1.00E-06

Table F.2

Model for Copper Noncancer Remedial Goal for Dermal Contact with Soil
Resident Farmer Child and Urban Resident Child
Colonie Site

$$RG\ (mg/kg) = \frac{THQ \times BW \times AT_{nc}}{EF \times ED \times AF \times SA \times ABS_d \times 1/RfD_d \times CF}$$

Exposure Scenario: Resident Farmer Child

Parameter	Definition	Value
THQ	Target hazard quotient.	1.0
BW	Body weight (kg).	15
AT_{nc}	Averaging time – noncancer (days).	2,190
EF	Exposure frequency (days/year).	350
ED	Exposure duration (years).	6
AF	Adherence factor (face, forearms, hands, lower legs, and feet) – child playing (indoor kid) (50th percentile) and adult soccer player (50th percentile) (mg/cm^2).	0.01
SA	Surface area exposed (head, forearms, hands, lower legs, and feet) (cm^2/day).	2,900
ABS_d	Skin absorption factor (unitless).	1.00E-02
RfD_d	Dermal reference dose (mg/kg-day).	4.00E-02
CF	Conversion factor (kg/mg).	1.00E-06

Exposure Scenario: Urban Resident Child

Parameter	Definition	Value
THQ	Target hazard quotient.	1.0
BW	Body weight (kg).	15
AT_{nc}	Averaging time – noncancer (days).	2,190
EF	Exposure frequency (days/year).	350
ED	Exposure duration (years).	6
AF	Adherence factor (face, forearms, hands, lower legs, and feet) – child playing (indoor kid) (50th percentile) and adult soccer player (50th percentile) (mg/cm^2).	0.01
SA	Surface area exposed (head, forearms, hands, lower legs, and feet) (cm^2/day).	2,900
ABS_d	Skin absorption factor (unitless).	1.00E-02
RfD_d	Dermal reference dose (mg/kg-day).	4.00E-02
CF	Conversion factor (kg/mg).	1.00E-06

Table F.3

Model for Copper Noncancer Remedial Goal for Dust Inhalation
Resident Farmer Child and Urban Resident Child
Colonie Site

$$RG\ (mg/kg) = \frac{THQ \times BW_c \times AT_{nc}}{EF \times ED \times IRA \times 1/RfD_i \times 1/PEF}$$

Exposure Scenario: Resident Farmer Child

Parameter	Definition	Value
THQ	Target hazard quotient.	1.0
BW_c	Body weight – child (kg).	15
AT_{nc}	Averaging time – noncancer (days).	2190
EF	Exposure frequency (days/year).	350
ED	Exposure duration (years).	6
IRA	Inhalation rate – child (m^3/day).	8.7
RfD_i	Inhalation reference dose (mg/kg-day)$^{-1}$.	NTV
PEF	Particulate emission factor, Hartford, CT value (m^3/kg).	1.06E+10

Exposure Scenario: Urban Resident Child

Parameter	Definition	Value
THQ	Target hazard quotient.	1.0
BW_c	Body weight – child (kg).	15
AT_{nc}	Averaging time – noncancer (days).	2190
EF	Exposure frequency (days/year).	350
ED	Exposure duration (years).	6
IRA	Inhalation rate – child (m^3/day).	8.7
RfD_i	Inhalation reference dose (mg/kg-day)$^{-1}$.	NTV
PEF	Particulate emission factor, Hartford, CT value (m^3/kg).	1.06E+10

NTV = No toxicity value.

Table F.4

Model for Copper Noncancer Remedial Goals
for Aboveground Vegetable Ingestion for Resident Farmer Child and Urban Resident Child
Colonie Site

$$RG\ (mg/kg) = \frac{THQ \times BW \times AT_n}{FI \times EF \times ED \times 1/RfD_o \times IRV\text{-}AG \times Br_{ag} \times CF}$$

Where:

THQ = Target hazard quotient (1.0).
BW = Body weight (15 kg).
AT_n = Averaging time (2,190 days).
FI_{farmer} = Fraction of contaminated vegetables ingested - resident farmer child (1.0).
FI_{urban} = Fraction of contaminated vegetables ingested - urban resident child (0.075).
EF = Exposure frequency (350 days/year).
ED = Exposure duration (6 years).
RfD_o = Oral reference dose, chemical-specific.
IRV-AG = Aboveground vegetable ingestion rate (17.9 g/day DW) (see EPA, 1998).
Br_{ag} = Plant-soil bioconcentration factor for produce (kg soil/kg plant tissue, DW) (see EPA, 1998).
CF = Conversion factor (1E-03 kg/g).

DW = Dry weight.

Table F.5

Model for Copper Noncancer Remedial Goals
for Belowground Vegetable Ingestion for Resident Farmer Child and Urban Resident Child
Colonie Site

$$RG\ (mg/kg) = \frac{THQ \times BW \times AT_n}{FI \times EF \times ED \times 1/RfD_o \times IRV\text{-}BG \times Br_{root\ veg} \times VG_{bg} \times CF}$$

Where:

THQ = Target hazard quotient (1.0).
BW = Body weight (15 kg).
AT_n = Averaging time (2,190 days).
FI_{farmer} = Fraction of contaminated vegetables ingested - resident farmer child (1.0).
FI_{urban} = Fraction of contaminated vegetables ingested - urban resident child (0.075).
EF = Exposure frequency (350 days/year).
ED = Exposure duration (6 years).
RfD_o = Oral reference dose, chemical-specific.
IRV-BG = Belowground vegetable ingestion rate (3.3 g/day DW) (see EPA, 1998).
VG_{bg} = Empirical correction factor, based on Log Kow (1.0) (see EPA, 1998).
$Br_{root\ veg}$ = Plant-soil concentration factor in root vegetables (kg soil/kg plant tissue, DW) (see EPA, 1998).
CF = Conversion factor (1E-03 kg/g).

DW = Dry weight.

Table F.6

Model for Copper Noncancer Industrial Occupant Worker Remedial Goal for Soil Ingestion

Colonie Site
Colonie, New York

$$\text{RG worker (mg/kg)} = \frac{\text{THQ x AT x BW}}{\text{FI x EF x ED x IRS x (1/RfD}_o\text{) x CF}}$$

Parameter	Definition	Value
THQ	Target hazard quotient.	1.0
AT	Noncancer averaging time (days).	9125
BW	Body weight (kg).	70
FI	Fraction of contaminated soil ingested (unitless).	1.0
EF	Exposure frequency (days/year).	375 [a]
ED	Exposure duration (years).	25
IRS	Soil ingestion rate (mg/day).	50
RfD_o	Oral reference dose (mg/kg-day).	4.00E-02
CF	Conversion factor (kg/mg).	1.00E-06

RG worker =Noncancer risk-based remedial goal in soil for occupational worker.
[a] 8-hour workday equivalent for 60 hour/week for 50 weeks/year (i.e., 3,000 hours/year).

Table F.7

Model for Copper Noncancer Industrial Occupant Worker Remedial Goal for Dermal Contact with Soil

Colonie Site
Colonie, New York

$$RG\ worker\ (mg/kg) = \frac{THQ \times AT \times BW}{EF \times ED \times SA \times AF \times ABS_d \times (1/RfD_d) \times CF}$$

Parameter	Definition	Value
THQ	Target hazard quotient.	1.0
AT	Noncancer averaging time (days).	9125
BW	Body weight (kg).	70
EF	Exposure frequency (days/year).	375 [a]
ED	Exposure duration (years).	25
SA	Exposed surface area based on head, hands and forearms (50th percentile) (cm^2/day) (EPA, 1997a).	3,281
AF	Weighted adherence factor based on 50th percentile for construction worker (mg/cm^2) (EPA, 1998b).	0.1
ABS_d	Dermal absorption factor (unitless).	1.00E-02
RfD_d	Dermal reference dose (mg/kg-day).	4.00E-02
CF	Conversion factor (kg/mg).	1.00E-06

RG worker =Noncancer risk-based remedial goal in soil for occupational worker.
[a] 8-hour workday equivalent for 60 hour/week for 50 weeks/year (i.e., 3,000 hours/year).
See Table x for calculation of the weighted adherence factor.

Table F.8

Models for Copper Noncancer Industrial Occupant Worker Remedial Goal for Inhalation of Particulate

Colonie Site
Colonie, New York

Inhalation of Particulate

$$\text{RG worker (mg/kg)} = \frac{\text{THQ x AT x BW}}{\text{IR x EF x ED x (1/RfD}_i\text{) x (1/PEF)}}$$

Parameter	Definition	Value
THQ	Target hazard quotient.	1.0
BW	Body weight (kg).	70
AT	Noncancer averaging time (days).	9125
IR	Inhalation rate (m3/d).	13.4
EF	Exposure frequency (days/year).	375 [a]
ED	Exposure duration (years).	25
PEF	Particulate emission factor, Hartford value (m^3/kg).	1.06E+10
RfDi	Inhalation reference dose (mg/kg-d).	NTV

NTV = No toxicity value.
RG worker =Noncancer risk-based remedial goal in soil for occupational worker.
[a] 8-hour workday equivalent for 60 hour/week for 50 weeks/year (i.e., 3,000 hours/year).

Table F.9

Model for Copper Noncancer Integrated Remedial Goals
Industrial Occupant Worker, Resident Farmer, and Urban Resident

Colonie Site
Colonie, New York

$$\text{Noncancer RG integrated (mg/kg)} = \frac{1}{((1/RG_{ing}) + (1/RG_{inh}) + (1/RG_{derm}) + (1/RG_{veg\ ing}))}$$

Parameter	Definition	Value
RG_{ing}	Soil ingestion remedial goals (mg/kg).	See Tables F.14 to F.16
RG_{inh}	Dust inhalation remedial goals (mg/kg).	See Tables F.14 to F.16
RG_{derm}	Dermal contact remedial goals (mg/kg).	See Tables F.14 to F.16
$RG_{veg\ ing}$	Vegetable ingestion remedial goals (mg/kg).	See Tables F.14 to F.16

Table F.10

Remediation Goals for Soil Ingestion
Colonie

Chemical	RfDo (mg/kg-d)	RfDi (mg/kg-d)	Soil Ingestion PRGs		
			Resident Farmer Child (mg/kg)	Urban Resident Child (mg/kg)	Industrial Worker (mg/kg)
Copper	4.00E-02	---	3,129	6,257	54,507

Table F.11

Remediation Goals for Dermal Contact
Colonie

Chemical	RfDo (mg/kg-d)	RfDd (mg/kg-d)	GI_{abs} (unitless)	Dermal Contact with Soil		
				Resident Farmer Child (mg/kg)	Urban Resident Child (mg/kg)	Industrial Worker (mg/kg)
Copper	4.00E-02	4.00E-02	1.00E+00	2,123,945	2,123,945	830,641

[a] Dermal reference doses were calculated by multiplying the oral reference dose and the oral to dermal adjustment factor.

Table F.12

Remediation Goals for Inhalation of Particulates
Colonie

Chemical	VOC	RfDo (mg/kg-d)	RfDI (mg/kg-d)	Inhalation of VOCs/Particulates		
				Resident Farmer Child (mg/kg)	Urban Resident Child (mg/kg)	Industrial Worker (mg/kg)
Copper	No	4.00E-02	---	NA	NA	NA

NA = Not applicable.

Table F.13

Remediation Goals for Aboveground and Belowground Vegetable Ingestion
Colonie

Chemical	RfDo (mg/kg-d)	BR_{ag} (kg soil/kg plant	BR_{rv} (kg soil/kg plant tissue, DW)	Aboveground Vegetable Ingestion PRGs		Belowground Vegetable Ingestion PRGs	
				Farmer Resident Child (mg/kg)	Urban Resident Child (mg/kg)	Farmer Resident Child (mg/kg)	Urban Resident Child (mg/kg)
Copper	4.00E-02	1.23E-01	2.50E-01	284	3,789	758	10,113

Table F.14
Noncancer Integrated Remediation Goals for Farmer Resident Child

Colonie Site

Chemical	Remedial Goals (mg/kg)					
	Ingestion	Dermal	Inhalation	Vegetable Ingestion		Integrated
				Aboveground	Belowground	
Copper	3,129	2,123,945	NA	284	758	194

NA = Not applicable.

Table F.15
Noncancer Integrated Remediation Goals for Urban Resident Child

Colonie Site

Chemical	Remedial Goals (mg/kg)					
				Vegetable Ingestion		
	Ingestion	Dermal	Inhalation	Aboveground	Belowground	Integrated
Copper	6,257	2,123,945	NA	3,789	10,113	1,912

NA = Not applicable.

Table F.16
Noncancer Integrated Remediation Goals for Industrial Worker

Colonie Site

Chemical	Remedial Goals (mg/kg)			
	Ingestion	Dermal	Inhalation	Integrated
Copper	54,507	830,641	NA	51,150

NA = Not applicable.

APPENDIX G:

Justification of RESRAD Soil Hydraulic Parameters

CONTENTS OF APPENDIX G

- Justification of Soil Hydraulic Parameters Values Chosen for Use in the Contaminated and Saturated Zones of RESRAD Pb Simulations.

Justification of soil hydraulic parameter values chosen for use in the contaminated and saturated zones of RESRAD simulations

Contaminated Zone:

The soil hydraulic parameters required as input by RESRAD, and the values we chose for them, are summarized in the following table while the justification for each of the parameters is provided further below.

Parameter	symbol	Units	RESRAD defaults	Values used
Porosity	θ_s	cm^3/cm^3	0.4	**0.3**
Slope of water retention curve	b	-	5.3	**3.5**
Saturated hydraulic conductivity	K_s	m/yr	10	**31.5**

Data presented in Table 1-4 of the 1995 EE/CA can be combined with data from the 1989 Bechtel report entitled "Distribution Ratios" (both are reprinted below) to estimate all three parameters listed in the table above.

van Genuchten equation fitting coefficients from the 1995 EE/CA.

Depth cm (ft)	Estimated Range	Residual Water Content (θ_r)	van Genuchten parameters		
			α	β	γ
20.3 (0.6)	Midpoint	0.0268	0.0832	1.44	0.305
	Low	0.0246	0.0550	1.44	0.305
	High	0.0278	0.111	1.45	0.309
160.0 (5.25)	Midpoint	0.0268	0.0832	1.44	0.305
	Low	0.0246	0.0550	1.44	0.305
	High	0.0278	0.111	1.45	0.309
203.2 (6.7)	Midpoint	0.0305	0.0666	1.48	0.322
	Low	0.0300	0.0441	1.48	0.322
	High	0.0305	0.0957	1.48	0.324
Source: DBAPE Parameter Estimator.					

were averaged to come up with a geometric mean of 9.90E-04 cm/sec (312 m/yr). This is reasonable for a sandy material, which fits the description of the manmade fill provided in the 1995 EE/CA. The permeability determined for the sample from B39MW10M, 2.6E-07 cm/sec (0.08 m/year), is closer to the value one would expect for a clay. Because fill material is usually relatively heterogeneous, it may contain some pockets of clay but it was decided that 312 m/yr is probably more representative of the unit as a whole.

- Water contents (θ) were measured at several locations and depths at the site and the data is presented in Table 1-2 of the 1995 EE/CA. Unfortunately, it is not noted whether the values tabulated are on a volume or a dry weight basis or even if the samples were taken from below the water table. This means that the numbers could be off by 20% – 80% (using a bulk density range 1.2 – 1.8). Instead of using these values, a value of 0.3 cm^3/cm^3 was chosen for the saturated water content (porosity = θ_{sat}) of the manmade fill material. Freeze and Cherry (1979) report a range of 0.25 – 0.50 for sands while McWorter and Sunada (1977) report a range of total porosity values 0.25 – 0.53 for fine sands.

Unfortunately, the RESRAD code DOES NOT USE the van Genuchten equation to represent the functional relationship $K(\theta)$, so the parameters listed above cannot be entered directly into the model. Instead, an approximation of the site-specific van Genuchten $K(\theta)$ curve was performed using a simplified version of the Campbell equation that is embedded in the RESRAD calculations. This equation has the form:

$$K(\theta) = K_{sat}\left(\frac{\theta}{\theta_{sat}}\right)^{2b+3}$$

Where:

b is a fitting parameter that can be correlated with the grain size distribution of the material.

K_{sat} and θ_{sat} have the same physical meanings as in the van Genuchten equation, but take on different values here because this is only the equation for a simple power function rather than a "S-shaped" curve like the van Genuchten equation.

The following figure shows:

1. The curves generated when the entire range of databased site-specific values are plugged into the van Genuchten equation. Lines corresponding to each of the 9 rows of data in the 1995 EE/CA table are so similar that they can hardly be distinguished from each other. The ranges of values provided in the table do produce visible differences in K(h), but that is not important for this work. K(h) is merely the conductivity plotted as a function of hydraulic head rather than as a function of water content.

2. The curve that is generated when the RESRAD default soil hydraulic parameters are plugged into the Campbell equation.

3. The curve that was generated by attempting to fit a Campbell function to the site-specific van Genuchten equation. This is not an optimized fit. In order to achieve a fit that will produce the most accurate simulations, it is important to attempt to match the site-specific van

Saturated Zone:

The same values for b and θ_{sat} were used in the saturated zone as in the contaminated zone because cross-sections show that the manmade fill extends well below the water table and that the bulk of the Pb distribution is still within this unit.

A different K_{sat} was used in the saturated zone. Sensitivity work on hydraulic conductivity in the saturated zone shows that the effect on the soil cleanup value is much larger than in the contaminated zone. Again, the larger the hydraulic conductivity, the more conservative the soil cleanup value will be. Because of the large impact of the saturated zone hydraulic conductivity, the site-specific value of 312 m/yr (the result of the constant head tests performed on soil cores in the laboratory) was used. It was mentioned above that K_{sat}, because of the difference between the site-specific $K(\theta)$ function and the simpler $K(\theta)$ function used in RESRAD, becomes a fitting parameter. This is because the entire $K(\theta)$ curve is determined from the K_{sat}, using the b value. Never in the simulations however, do water contents approach saturation (at which the K_{sat} value would be used). In the saturated zone, this obviously does not hold true. By definition, Ksat is used over the entire thickness of the water table aquifer. The reason a b value still has to be specified is that RESRAD assumes a 0.001 m/yr water table drop over the course of simulation. Multiplying this value by 1000 yrs shows that the total water table drop of 1 m is small and that the sensitivity of the simulations to the b parameter is negligible.

APPENDIX H:

Off-Site Resident Farmer Analyses

CONTENTS OF APPENDIX H

- Description of RESRAD and DOMENICO analysis to estimate off-site groundwater concentrations.

- RESRAD Report, Part I: Mixture Sums and Single Radionuclide Guidelines – Appendix K analysis to determine undiluted Groundwater Pathway Dose to an off-site Resident Farmer

- RESRAD Report, Part II: Source Terms, Factors, and Parameters for Individual Pathways – Appendix K analysis to determine breakthrough times for uranium, thorium, and lead.

- RESRAD Report, Part IV: Concentration of Radionuclides – On-Site Resident Farmer Scenario groundwater concentrations, to determine U-238 cleanup criteria using DOMENICO

1. USE OF RESRAD CODE TO ESTIMATE OFF-SITE CLEANUP CRITERIA

The RESRAD code is designed to calculate on-site individual doses; it does not include models for calculating individual and collective doses at off-site locations. However, off-site doses can be estimated using methods presented in Appendix K of (ANL1993b). The chief off-site pathway of concern is groundwater.

The method for estimating off-site doses from waterborne pathways is presented in Section K.3. This approximate method makes use of the unsaturated zone transport model of RESRAD in which advective transport and the decay and ingrowth of the radionuclides are considered. The effects of transverse dispersion are included in an off-site dilution factor.

The RESRAD code can be used to model transport in the saturated zone by specifying that the saturated zone be an unsaturated zone with a unit saturation ratio. It is apparent that setting the hydraulic conductivity of this zone to the infiltration (percolation) rate, I, would ensure a saturation ratio of one.

$$\hat{K}_s^{(uz)} = I = (1-C_e)[(1-C_r)P_r + I_{rr}], \tag{K.5}$$

where

$\hat{K}_s^{(uz)}$	=	hydraulic conductivity of the unsaturated stratum simulating the saturated zone (m/yr),
I	=	infiltration rate (m/yr),
C_e	=	evapotranspiration coefficient,
C_r	=	runoff coefficient,
P_r	=	precipitation rate (m/yr), and
I_{rr}	=	irrigation rate (m/yr).

The depth of this "unsaturated" zone, Δz_{sz}, is given by

$$\Delta z_{sz} = \frac{L^{(sz)} \times I}{K_s^{(sz)} \times J_x}, \tag{K.6}$$

where

Δz_{sz}	=	thickness of the unsaturated stratum simulating the saturated zone (m),
$L^{(sz)}$	=	distance from the downgradient edge of the contaminated zone to the well or the surface water source (m),
I	=	infiltration rate (m/yr),
$K_s^{(sz)}$	=	hydraulic conductivity of the saturated zone (m/yr), and
J_x	=	hydraulic gradient in the direction of flow (m/m).

The value for depth of the well below the water table to be input to RESRAD, $\hat{d}_w$, in order to achieve the desired rise time is given by

$$\hat{d}_w = d_w - \xi = d_w - \frac{L^{(sz)} \times I}{K_s^{(sz)} \times J_x}, \qquad \text{(K.8)}$$

where

$\hat{d}_w$	=	value of depth of well below the water table to be used in RESRAD for the off-site well (m),
d_w	=	actual depth of well below the water table (m),
ξ	=	depth from the water table to the upper boundary of contamination at the well (m),
$L^{(sz)}$	=	distance from the downgradient edge of the contaminated zone to the well (m),
I	=	infiltration rate (m/yr),
$K_s^{(sz)}$	=	hydraulic conductivity of the saturated zone (m/yr), and
J_x	=	hydraulic gradient in the direction of flow (m/m).

Horizontal dilution is dilution due to lateral disperson and convergence of streamlines in the horizontal plan due to the withdrawal of water. The effective diameter of the well (1.89 m, Equation E.28) is small in comparison to the width of the contaminated zone (24 m) so the horizontal dilution factor is approximated by

$$DF_h = erf\left(\frac{w}{4\sqrt{\alpha_T L}}\right), \qquad \text{(K.15)}$$

where

DF_h	=	horizontal dilution factor,
$erf()$	=	error function tabulated in mathematical handbooks,
L^{sz}	=	distance from the downgradient edge of the contaminated zone to the well (m),
A	=	Area of contaminated zone (m^2),
l	=	length of the contaminated zone parallel to the aquifer
w	=	A/l, width of the contaminated zone (m),
α_T	=	lateral dispersivity (m), and
L	=	$L^{sz} + l/2$, distance from the center of the contaminated zone to the well (m).

If the off-site saturated zone is simulated as an unsaturated zone by using the input values obtained from Equations K.5, K.6, and K.8, RESRAD will compute the correct breakthrough time, rise time, and the decay transfer function. However, RESRAD will not compute the correct dilution factor for the well water concentration. The user will

have to multiply those output quantities (and only those quantities) that are directly affected by the well water pathway by the DF/f_1 factors given by

$$\frac{DF}{f_1} = \frac{d_w - \zeta}{d_w} DF_h, \qquad \text{(K.16)}$$

where

DF/f_1	=	multiplication factor to introduce off-site dilution,
DF_h	=	horizontal dilution factor,
d_w	=	depth of well below the water table (m),
I	=	infiltration rate (m/yr),
l	=	length of the contaminated zone parallel to the aquifer
$K_s^{(sz)}$	=	hydraulic conductivity of the saturated zone (m/yr),
J_x	=	hydraulic gradient in the direction of flow (m/m),
V_{wfr}	=	$K_s^{sz} \times J_x$, Darcy flow velocity in the saturated zone (m/yr),
ζ	=	$l \times I/V_{wfr}$, depth from the water table to the lower boundary of contamination at the downgradient edge of the contaminated zone (m).

The effective pumping diameter of the well is calculated by

$$d_r = \frac{U_w}{K_s^{(sz)} J_x d_w}, \qquad \text{(E.28)}$$

where

d_r	=	effective pumping diameter of the well (m),
U_w	=	well pumping rate (m^3/yr),
$K_s^{(sz)}$	=	hydraulic conductivity of the saturated zone (m/yr),
J_x	=	hydraulic gradient in the direction of flow (m/m), and
d_w	=	depth of well below the water table (m).

Equations K.5, K.6, and K.8 were used to develop the parameters for the unsaturated zone used to simulate off-site transport in the saturated zone. Equations K.15, K.16, and E.28 were used to determine horizontal dilution factors and finally the multiplication factor to introduce off-site dilution. The input data and the results of these calculations are shown in Table 1.

The parameters from Equations K.5, K.6, and K.8 were used along with all other parameters for the on-site RESRAD radiological analysis to run RESRAD for the purpose of estimated off-site dose. It is assumed that there are no restrictions on off-site land usage, so the Resident Farmer Scenario was selected. There is no contaminated soil zone at the off-site location so only groundwater pathways are assumed to exist there.

The RESRAD Summary Report and Detailed Report are included at the end of this Appendix. Breakthrough time is the time following the start of the dose assessment at which radionuclides first appear in the water at the point of use. The detailed report shows that neither thorium or lead breakthrough to the on-site well within the 1,000 year dose assessment period so off-site dose from these elements is zero. Consequently, only a RESRAD Summary Report for Uranium is of interest. The U-238 water dependent pathway dose contributions for a 1 pCi/g soil concentration are shown in Table 2 along with the U-238 cleanup criterion. These dose contributions are modified using the dilution multiplication factor calculated by Equation K.16 to determine an off-site cleanup criteria for U-238 of 135 pCi/g as shown in Table 2.

2. USE OF DOMENICO TO ESTIMATE OFF-SITE CLEANUP CRITERIA

Lead has already been observed in on-site groundwater; however, the results of the RESRAD Appendix K analysis indicated that lead would not reach the off-site well. The RESRAD analysis may be non-conservative, so an independent assessment of the off-site groundwater pathway for lead and uranium was performed using the DOMENICO program. DOMENICO was not used to analyze thorium because its extremely high distribution coefficient (Kd) precludes breakthrough in the during the 1,000 year dose assessment period.

DOMENICO is an analytical solution, similar to any one of the 1-D codes that solute would use, that is coded in spreadsheet form. The program was obtained from the Pennsylvania Department of environmental protection website and it is the code that many similar codes (like bioscreen and bioplume) are based on.

The list of input parameters is shown in Table 3 for uranium and lead. Calculated uranium and lead off-site groundwater concentration as a percentage of steady-state on-site groundwater concentration for various times after initial on-site groundwater contamination are shown in Table 4.

A chart of the dependence of dispersivity on scale of measurement from *Fetter's 1993 Contaminant Hydrogeology* was used to obtain the dispervity value. The method for obtaining vertical dispersivity was to assume that it is 0.1 times the longitudinal dispersivity. The K_{sat} values were determined as described in Appendix A

Lead does not breakthrough to the off-site well until approximately 1,000 years so the concentration ratio of 0.1% for the 1,000 year time period us used. This is very conservative assumption because it assumes that the on-site concentration at 1,000 years has existed steady state over the 1,000 year period. In actuality the concentration would increase over the 1,000 year period.

In contrast to lead, substantial Uranium breakthrough occurs within the 1,000 year dose assessment period because of its substantially lower distribution coefficient (Kd). Consequently, use of the 1,000 year off-site groundwater concentration ratio gives results

that are too overly conservative, because the assumption of steady state on-site concentrations is extremely inaccurate. On-site groundwater concentrations will start off very low and increase substantially over the 1,000 year dose assessment period.

Off-site U-238 concentrations as a function of time can be estimated assuming step changes in steady state concentration. It is assumed that the on-site concentration at 0 years has a 1,000 year steady state concentration period to migrate off-site, the concentration at 100 years has 900 year steady state concentration period to migrate off-site, etc. Use of the Resident Farmer ground water concentrations as a function of time along with the DOMENICO concentration ratios permits an estimate of off-site concentration as a function of time as shown in Table 5.

Based on the results shown in Table 5, the maximum off-site concentration during the 1,000 year dose assessment would be approximately 1.43 pCi/L. This is 33.6% of the maximum concentration for the on-site Resident Farmer Scenario of 4.26 pCi/L. The Resident Farmer Scenario with a groundwater concentration of 4.26 pCi/L results in a U-238 cleanup criterion of 37 pCi/g of which, approximately 97.9% is due to groundwater pathways. Consequently, the U-238 cleanup criterion for an off-site Resident Farmer Scenario with a groundwater concentration of 1.43 pCi/L can be estimated as 110 pCi/g (37*4.26÷1.43).

3. U-238 OFF-SITE CLEANUP CRITERION

RESRAD predicts no breakthrough for lead during the 1,000 year dose assessment period. DOMENICO predicts breakthrough at 1,000 years at an off-site to on-site groundwater concentration ratio of 0.1%. The DOMENICO result is more conservative than RESRAD so it will be used to evaluate the dose to the Off-Site Resident Farmer for the Urban Resident and Industrial Occupant Scenario.

RESRAD predicts breakthrough for uranium at 438years, and the Appendix K analysis calculates a U-238 cleanup criterion of 135 pCi/g. DOMENICO predicts substantial breakthrough at 200 years at and off-site to on-site groundwater concentration ratio of 0.1%. Use of the DOMENICO to determine a time-dependent off-site groundwater concentration results in a U-238 cleanup criterion of 110 pCi/g. The DOMENICO result is more conservative than RESRAD so it will be used to evaluate the dose to the Off-Site Resident Farmer for the Urban Resident and Industrial Occupant Scenario.

Table 1
RESRAD Appendix K Analysis

Equation K.5				
symbol	source	value	units	description
I	calculated	0.4511	m/yr	infiltration rate
$K_s^{(sz)}$	calculated	0.4511	m/yr	hydraulic conductivity of unsat. zone simulating the sat. zone
C_e	input	0.5	unitless	evapotranspiration coefficient
C_r	input	0.2	unitless	runoff coefficient
P_r	input	0.899	m/yr	precipitation rate
I_r	input	0.183	m/yr	irrigation rate

Equation K.6				
symbol	source	value	units	description
Δz_{sz}	calculated	2.89	m	thickness of unsaturated zone simulating saturated zone
$L^{(sz)}$	input	40	m	distance from edge of contaminated zone to well
I	calculated	0.4511	m/yr	infiltration rate
$K_s^{(sz)}$	input	312	m/yr	hydraulic conductivity of the saturated zone
J_x	input	0.02	unitless	hydraulic gradient in the direction of flow

Equation K.8				
symbol	source	value	units	description
d_w	calculated	7.11	m	depth of well water below water table for RESRAD input
d_w	input	10	m	actual depth of well below the water table
$L^{(sz)}$	input	40	m	distance from edge of contaminated zone to well
I	calculated	0.4511	m/yr	infiltration rate
$K_s^{(sz)}$	input	312	m/yr	hydraulic conductivity of the saturated zone
J_x	input	0.02	unitless	hydraulic gradient in the direction of flow

Equations K.15				
symbol	source	value	units	description
DF_h	calculated	0.898	unitless	horizontal dilution factor
w	calculated	24	m	width of the contaminated zone
A	input	2400	m^2	area of the contaminated zone
α_T	input	0.3	m	lateral dispersivity
l	input	100	m	length of contaminated zone parallel to the aquifer
$L^{(sz)}$	input	40	m	distance from edge of contaminated zone to well
L	calculated	90	m	distance from the center of the contaminaed zone to the well
d_r	calculated	1.89	m	effective diameter of well (Eq. E.28), if needed.

Equations K.16				
symbol	source	value	units	description
DF/f_1	calculated	0.249	unitless	multiplication factor to introduce off-site dilution
DF_h	calculated	0.898	unitless	horizontal dilution factor
d_w	input	10	m	actual depth of well below the water table
d_r	calculated	1.89	m	effective diamter of well (Eq. E.28), if needed.
w	calculated	24	m	width of the contaminated zone
l	input	100	m	length of contaminated zone paralell to the aquifer
I	calculated	0.4511	m/yr	infiltration rate
$K_s^{(sz)}$	input	312	m/yr	hydraulic conductivity of the saturated zone
J_x	input	0.02	unitless	hydraulic gradient in the direction of flow

Equations E.28				
symbol	source	value	units	description
d_r	calculated	1.89	m	effective diamter of well (Eq. E.28), if needed.
U_w	input	118	m^3/yr	well pumping rate
d_w	input	10	m	actual depth of well below the water table
$K_s^{(sz)}$	input	312	m/yr	hydraulic conductivity of the saturated zone
J_x	input	0.02	unitless	hydraulic gradient in the direction of flow

Table 2
RESRAD Undiluted and Diluted Groundwater Pathway Dose and Cleanup Criteria

	undiluted mrem/yr per pCi/g	diluted mrem/yr per pCi/g
water	6.22E-01	1.55E-01
plant	8.61E-02	2.14E-02
meat	2.98E-03	7.41E-04
milk	3.36E-02	8.36E-03
total	7.45E-01	1.85E-01
DCGL[1]	3.36E+01	1.35E+02

[1] pCi/g U-238

Table 3
DOMENICO Input Parameters

Input Summary for U-238

Parameter	*Value (SI units)*	*Source of value*
saturated hydraulic conductivity	312 (m/yr)	geometric mean of several constant head tests for one location in manmade fill
hydraulic gradient	0.02 (m/m)	site-specific avg. for upper sand unit using 1999 EE/CA2 Fig. 2-12
porosity	0.3 (mL/mL)	estimated from range given in Freeze & Cherry, 1980
bulk density	1.5 (g/mL)	RESRAD default (site-specific values too variable)
longitudinal dispersivity	3 (m)	estimate using Fetter, 1993
lateral dispersivity	0.3 (m)	estimate using Fetter, 1993
vertical dispersivity	0.3 (m)	estimate using Fetter, 1993
half-life	1 billion years	same as RESRAD
Kd	62 (kg/L)	same as RESRAD
plume height at source	9 (m)	same as RESRAD
plume width at source	122 (m)	guess using soil contam. Along C-C in figure 2-8 of 1999 EE/CA2
distance of receptor from source	40 (m)	same as steve for his offsite simulations using RESRAD

Input Summary for Lead

Parameter	*Value (SI units)*	*Source of value*
saturated hydraulic conductivity	312 (m/yr)	geometric mean of several constant head tests for one location in manmade fill
hydraulic gradient	0.02 (m/m)	site-specific avg. for upper sand unit using 1999 EE/CA2 Fig. 2-12
porosity	0.3 (mL/mL)	estimated from range given in Freeze & Cherry, 1980
bulk density	1.5 (g/mL)	RESRAD default (site-specific values too variable)
longitudinal dispersivity	3 (m)	estimate using Fetter, 1993
lateral dispersivity	0.3 (m)	estimate using Fetter, 1993
vertical dispersivity	0.3 (m)	estimate using Fetter, 1993
half-life	1 billion years	same as RESRAD
Kd	270 (kg/L)	same as RESRAD
plume height at source	9 (m)	same as steve for his offsite simulations using RESRAD
plume width at source	122 (m)	guess using soil contam. Along C-C in figure 2-8 of 1999 EE/CA2
distance of receptor from source	40 (m)	same as steve for his offsite simulations using RESRAD

Table 4
DOMENICO Results

time (yrs)	U-238 offsite C (% of source C)
100	0.0
200	0.1
300	3.3
400	14.0
500	30.1
600	46.9
700	61.2
800	72.0
900	79.6
1000	84.7
1100	87.9
1500	92.5
2000	93.2
5000	93.2
10000	93.2

time (yrs)	lead offsite C (% of source C)
1000	0.1
1500	2.6
2000	12.6
2500	29.0
3000	46.6
3500	61.4
4000	72.3
4500	79.7
5000	84.4
5500	87.2
6000	88.9
6500	89.9
7000	90.5
7500	90.8
8000	91.0
9000	91.1
10000	91.2

Table 5
DOMENICO Results, Off-Site U-238 Concentration as a Function of Time

years since release	Res. Farm. on-site pCi/L	Steady State time (yrs)	U-238 offsite C (% of source C)	off-site 1000 yr pCi/L
0	0.00000	1,000	84.7	0.00000
1	0.01058	1,000	84.7	0.00896
3	0.03174	1,000	84.7	0.02688
10	0.10510	1,000	84.7	0.08899
30	0.30840	1,000	84.7	0.26113
50	0.50300	1,000	84.7	0.42590
100	0.95350	900	79.6	0.75905
300	2.33200	700	61.2	1.42743
400	2.60757	600	46.9	1.22325
500	2.88314	500	30.1	0.86801
600	3.15871	400	14.0	0.44110
700	3.43429	300	3.3	0.11443
800	3.70986	200	0.1	0.00553
900	3.98543	100	8.5E-06	3.39E-07
1000	4.26100	0	0.0	0

RESRAD Report, Part I: Mixture Sums and Single Radionuclide Guidelines – Appendix K analysis used to determine undiluted Groundwater Pathway Dose to an off-site Resident Farmer

Summary : Off-Site Resident Farmer Colonie Site Specific for Uranium

File : OFFFARMU.RAD

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Dose Conversion Factor (and Related) Parameter Summary

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

Dose Conversion Factor (and Related) Parameter Summary (continued)

File: Default.LIB

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

Summary : Off-Site Resident Farmer Colonie Site Specific for Uranium

File : OFFFARMU.RAD

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.400E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.000E+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)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	5.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): U-234	1.000E+00	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): U-235	1.000E+00	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): U-238	1.000E+00	0.000E+00	---	S1(8)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(8)
R013	Cover depth (m)	6.096E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.431E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.150E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	3.500E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.990E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.830E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.431E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	3.120E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	3.500E+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)	7.110E+00	1.000E+01	---	DWIBWT

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	2.890E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.431E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	3.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	3.500E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	4.511E-01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	6.200E+01	5.000E+01	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	6.200E+01	5.000E+01	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	6.200E+01	5.000E+01	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.536E-03	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	6.200E+01	5.000E+01	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	6.200E+01	5.000E+01	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	6.200E+01	5.000E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.536E-03	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	6.200E+01	5.000E+01	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	6.200E+01	5.000E+01	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	6.200E+01	5.000E+01	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.536E-03	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	4.200E+02	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	4.200E+02	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	4.200E+02	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.752E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Pa-231				
R016	Contaminated zone (cm**3/g)	5.100E+02	5.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	5.100E+02	5.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	5.100E+02	5.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.090E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.835E-04	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.151E-04	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	3.000E+05	6.000E+04	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	3.000E+05	6.000E+04	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	3.000E+05	6.000E+04	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.254E-07	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.571E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.101E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.120E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.140E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	2.330E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.510E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	4.785E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	1.000E+00	-1	---	FPLANT
R018	Contamination fraction of meat	1.000E+00	-1	---	FMEAT
R018	Contamination fraction of milk	1.000E+00	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	2.710E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	6.325E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	6.000E+01	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	2.500E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	1.230E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	1.500E-01	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	0.000E+00	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	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	active
5 -- milk ingestion	active
6 -- aquatic foods	suppressed
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

Summary : Off-Site Resident Farmer Colonie Site Specific for Uranium

File : OFFFARMU.RAD

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	2400.00 square meters	U-234	1.000E+00
Thickness:	2.00 meters	U-235	1.000E+00
Cover Depth:	0.61 meters	U-238	1.000E+00

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 25 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	9.448E-02	9.467E-02	9.505E-02	9.639E-02	1.003E-01	1.042E-01	1.136E-01	1.462E-01	2.544E+00
M(t):	3.779E-03	3.787E-03	3.802E-03	3.856E-03	4.011E-03	4.167E-03	4.543E-03	5.848E-03	1.018E-01

Maximum TDOSE(t): 2.544E+00 mrem/yr at t = 1.000E+03 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	8.518E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.047E-02	0.3225	1.370E-04	0.0014	2.019E-03	0.0214	0.000E+00	0.0000
U-235	1.981E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.879E-02	0.3047	1.321E-04	0.0014	1.905E-03	0.0202	0.000E+00	0.0000
U-238	1.843E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	2.896E-02	0.3065	1.302E-04	0.0014	1.920E-03	0.0203	0.000E+00	0.0000
Total	2.041E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	8.822E-02	0.9337	3.993E-04	0.0042	5.844E-03	0.0619	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.262E-02	0.3453
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.083E-02	0.3263
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.103E-02	0.3284
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.448E-02	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.
U-234	2.265E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.049E-02	0.3221	1.371E-04	0.0014	2.021E-03	0.0214	0.000E+00	0.0000
U-235	2.016E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.891E-02	0.3054	1.386E-04	0.0015	1.907E-03	0.0201	0.000E+00	0.0000
U-238	1.863E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	2.899E-02	0.3062	1.303E-04	0.0014	1.921E-03	0.0203	0.000E+00	0.0000
Total	2.065E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	8.839E-02	0.9337	4.061E-04	0.0043	5.850E-03	0.0618	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.265E-02	0.3449
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.096E-02	0.3271
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.106E-02	0.3280
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.467E-02	1.0000

*Sum of all water independent and dependent pathways.

Summary : Off-Site Resident Farmer Colonie Site Specific for Uranium

File : OFFFARMU.RAD

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	9.455E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.055E-02	0.3214	1.374E-04	0.0014	2.025E-03	0.0213	0.000E+00	0.0000
U-235	2.087E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.916E-02	0.3068	1.518E-04	0.0016	1.911E-03	0.0201	0.000E+00	0.0000
U-238	1.903E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	2.904E-02	0.3055	1.306E-04	0.0014	1.925E-03	0.0202	0.000E+00	0.0000
Total	2.112E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	8.875E-02	0.9337	4.197E-04	0.0044	5.860E-03	0.0617	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.271E-02	0.3441
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.123E-02	0.3286
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.111E-02	0.3273
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.505E-02	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.
U-234	8.552E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.073E-02	0.3188	1.382E-04	0.0014	2.037E-03	0.0211	0.000E+00	0.0000
U-235	2.355E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.008E-02	0.3120	1.986E-04	0.0021	1.922E-03	0.0199	0.000E+00	0.0000
U-238	2.050E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	2.921E-02	0.3030	1.313E-04	0.0014	1.936E-03	0.0201	0.000E+00	0.0000
Total	2.285E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	9.001E-02	0.9338	4.681E-04	0.0049	5.895E-03	0.0612	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.290E-02	0.3413
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.220E-02	0.3340
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.129E-02	0.3246
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.639E-02	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.
U-234	8.876E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.116E-02	0.3107	1.401E-04	0.0014	2.065E-03	0.0206	0.000E+00	0.0000
U-235	3.336E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.290E-02	0.3280	3.383E-04	0.0034	1.950E-03	0.0194	0.000E+00	0.0000
U-238	2.534E-05	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	2.961E-02	0.2953	1.331E-04	0.0013	1.963E-03	0.0196	0.000E+00	0.0000
Total	2.869E-05	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	9.366E-02	0.9340	6.116E-04	0.0061	5.978E-03	0.0596	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.336E-02	0.3327
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.519E-02	0.3509
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.173E-02	0.3164
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	1.003E-01	1.0000

*Sum of all water independent and dependent pathways.

Summary : Off-Site Resident Farmer Colonie Site Specific for Uranium

File : OFFFARMU.RAD

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

As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
U-234	3.017E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.148E-02	0.3022	1.416E-04	0.0014	2.086E-03	0.0200	0.000E+00	0.0000
U-235	4.730E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.595E-02	0.3451	4.863E-04	0.0047	1.972E-03	0.0189	0.000E+00	0.0000
U-238	3.134E-05	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	2.990E-02	0.2870	1.344E-04	0.0013	1.982E-03	0.0190	0.000E+00	0.0000
Total	3.610E-05	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	9.733E-02	0.9344	7.624E-04	0.0073	6.040E-03	0.0580	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 5.000E+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.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.370E-02	0.3236
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.841E-02	0.3688
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.205E-02	0.3077
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	1.042E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	2.049E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.188E-02	0.2807	1.440E-04	0.0013	2.113E-03	0.0186	0.000E+00	0.0000
U-235	1.134E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	4.414E-02	0.3886	8.861E-04	0.0078	1.999E-03	0.0176	0.000E+00	0.0000
U-238	5.328E-05	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	3.021E-02	0.2660	1.358E-04	0.0012	2.002E-03	0.0176	0.000E+00	0.0000
Total	6.482E-05	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	1.062E-01	0.9353	1.166E-03	0.0103	6.114E-03	0.0538	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.414E-02	0.3006
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.704E-02	0.4142
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.240E-02	0.2853
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	1.136E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	1.600E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	3.025E-02	0.2069	1.450E-04	0.0010	2.003E-03	0.0137	0.000E+00	0.0000
U-235	3.675E-04	0.0025	0.000E+00	0.0000	0.000E+00	0.0000	7.894E-02	0.5400	2.716E-03	0.0186	1.858E-03	0.0127	0.000E+00	0.0000
U-238	4.452E-04	0.0030	0.000E+00	0.0000	0.000E+00	0.0000	2.751E-02	0.1882	1.237E-04	0.0008	1.823E-03	0.0125	0.000E+00	0.0000
Total	8.287E-04	0.0057	0.000E+00	0.0000	0.000E+00	0.0000	1.367E-01	0.9350	2.985E-03	0.0204	5.684E-03	0.0389	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.241E-02	0.2217
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.388E-02	0.5738
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.990E-02	0.2045
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	1.462E-01	1.0000

*Sum of all water independent and dependent pathways.

Summary : Off-Site Resident Farmer Colonie Site Specific for Uranium

File : OFFFARMU.RAD

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	3.587E-03	0.0014	2.297E-05	0.0000	0.000E+00	0.0000	1.975E-02	0.0078	5.931E-04	0.0002	3.153E-03	0.0012	4.225E-04	0.0002
U-235	3.197E-02	0.0126	1.167E-04	0.0000	0.000E+00	0.0000	1.239E-01	0.0487	1.669E-02	0.0066	2.304E-03	0.0009	2.465E-03	0.0010
U-238	4.669E-03	0.0018	1.872E-05	0.0000	0.000E+00	0.0000	7.124E-03	0.0028	2.683E-04	0.0001	1.964E-03	0.0008	2.988E-04	0.0001
Total	4.022E-02	0.0158	1.584E-04	0.0001	0.000E+00	0.0000	1.507E-01	0.0592	1.755E-02	0.0069	7.421E-03	0.0029	3.186E-03	0.0013

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	6.516E-01	0.2561	0.000E+00	0.0000	0.000E+00	0.0000	9.022E-02	0.0355	3.127E-03	0.0012	3.520E-02	0.0138	8.077E-01	0.3175
U-235	6.692E-01	0.2630	0.000E+00	0.0000	0.000E+00	0.0000	9.266E-02	0.0364	4.442E-03	0.0017	3.335E-02	0.0131	9.771E-01	0.3841
U-238	6.222E-01	0.2446	0.000E+00	0.0000	0.000E+00	0.0000	8.614E-02	0.0339	2.980E-03	0.0012	3.363E-02	0.0132	7.593E-01	0.2985
Total	1.943E+00	0.7638	0.000E+00	0.0000	0.000E+00	0.0000	2.690E-01	0.1057	1.055E-02	0.0041	1.022E-01	0.0402	2.544E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	3.262E-02	3.265E-02	3.271E-02	3.290E-02	3.335E-02	3.367E-02	3.401E-02	3.094E-02	7.893E-01
U-234	Th-230	1.000E+00	0.000E+00	3.308E-07	7.608E-07	2.294E-06	6.908E-06	1.184E-05	2.540E-05	9.085E-05	2.743E-04
U-234	Ra-226	1.000E+00	0.000E+00	1.133E-08	6.145E-08	5.647E-07	4.988E-06	1.423E-05	6.133E-05	6.868E-04	9.739E-03
U-234	Pb-210	1.000E+00	0.000E+00	2.878E-10	3.066E-09	7.464E-08	1.629E-06	6.740E-06	4.372E-05	6.991E-04	8.363E-03
U-234	∑DSR(j)		3.262E-02	3.265E-02	3.271E-02	3.290E-02	3.336E-02	3.370E-02	3.414E-02	3.241E-02	8.077E-01
U-235	U-235	1.000E+00	3.078E-02	3.081E-02	3.086E-02	3.104E-02	3.147E-02	3.178E-02	3.210E-02	2.956E-02	7.730E-01
U-235	Pa-231	1.000E+00	0.000E+00	1.522E-04	3.602E-04	1.101E-03	3.320E-03	5.678E-03	1.208E-02	4.168E-02	1.300E-01
U-235	Ac-227	1.000E+00	0.000E+00	1.414E-06	6.861E-06	5.580E-05	4.000E-04	9.560E-04	2.848E-03	1.264E-02	7.409E-02
U-235	∑DSR(j)		3.078E-02	3.096E-02	3.123E-02	3.220E-02	3.519E-02	3.841E-02	4.704E-02	8.388E-02	9.771E-01
U-238	U-238	1.000E+00	3.103E-02	3.106E-02	3.111E-02	3.129E-02	3.173E-02	3.204E-02	3.239E-02	2.988E-02	7.571E-01
U-238	U-234	1.000E+00	0.000E+00	1.389E-07	3.246E-07	9.793E-07	2.884E-06	4.821E-06	9.691E-06	2.637E-05	2.242E-03
U-238	Th-230	1.000E+00	0.000E+00	7.501E-13	3.846E-12	3.418E-11	2.953E-10	8.306E-10	3.467E-09	3.385E-08	2.416E-07
U-238	Ra-226	1.000E+00	0.000E+00	1.691E-14	2.041E-13	5.575E-12	1.421E-10	6.664E-10	5.616E-09	1.748E-07	6.532E-06
U-238	Pb-210	1.000E+00	0.000E+00	3.508E-16	7.969E-15	5.687E-13	3.652E-11	2.542E-10	3.376E-09	1.642E-07	6.571E-06
U-238	∑DSR(j)		3.103E-02	3.106E-02	3.111E-02	3.129E-02	3.173E-02	3.205E-02	3.240E-02	2.990E-02	7.593E-01

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

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 25 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	7.663E+02	7.656E+02	7.643E+02	7.599E+02	7.494E+02	7.417E+02	7.323E+02	7.713E+02	3.095E+01
U-235	8.109E+02	8.075E+02	8.005E+02	7.764E+02	7.105E+02	6.508E+02	5.315E+02	2.980E+02	2.559E+01
U-238	8.057E+02	8.050E+02	8.036E+02	7.989E+02	7.879E+02	7.801E+02	7.717E+02	8.360E+02	3.292E+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 = 1.000E+03 years

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
U-234	1.000E+00	1.000E+03	8.077E-01	3.095E+01	8.077E-01	3.095E+01
U-235	1.000E+00	1.000E+03	9.771E-01	2.559E+01	9.771E-01	2.559E+01
U-238	1.000E+00	1.000E+03	7.593E-01	3.292E+01	7.593E-01	3.292E+01

Summary : Off-Site Resident Farmer Colonie Site Specific for Uranium

File : OFFFARMU.RAD

Individual Nuclide Dose Summed Over All Pathways

Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr								
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	3.262E-02	3.265E-02	3.271E-02	3.290E-02	3.335E-02	3.367E-02	3.401E-02	3.094E-02	7.893E-01
U-234	U-238	1.000E+00	4.625E-08	1.389E-07	3.246E-07	9.793E-07	2.884E-06	4.821E-06	9.691E-06	2.637E-05	2.242E-03
U-234	∑DOSE(j):		3.262E-02	3.265E-02	3.271E-02	3.290E-02	3.335E-02	3.368E-02	3.402E-02	3.096E-02	7.916E-01
Th-230	U-234	1.000E+00	1.169E-07	3.308E-07	7.608E-07	2.294E-06	6.908E-06	1.184E-05	2.540E-05	9.085E-05	2.743E-04
Th-230	U-238	1.000E+00	1.151E-13	7.501E-13	3.846E-12	3.418E-11	2.953E-10	8.306E-10	3.467E-09	3.385E-08	2.416E-07
Th-230	∑DOSE(j):		1.169E-07	3.308E-07	7.608E-07	2.294E-06	6.909E-06	1.184E-05	2.540E-05	9.088E-05	2.746E-04
Ra-226	U-234	1.000E+00	1.536E-09	1.133E-08	6.145E-08	5.647E-07	4.988E-06	1.423E-05	6.133E-05	6.868E-04	9.739E-03
Ra-226	U-238	1.000E+00	1.058E-15	1.691E-14	2.041E-13	5.575E-12	1.421E-10	6.664E-10	5.616E-09	1.748E-07	6.532E-06
Ra-226	∑DOSE(j):		1.536E-09	1.133E-08	6.145E-08	5.647E-07	4.988E-06	1.423E-05	6.134E-05	6.869E-04	9.746E-03
Pb-210	U-234	1.000E+00	2.203E-11	2.878E-10	3.066E-09	7.464E-08	1.629E-06	6.740E-06	4.372E-05	6.991E-04	8.363E-03
Pb-210	U-238	1.000E+00	1.305E-17	3.508E-16	7.969E-15	5.687E-13	3.652E-11	2.542E-10	3.376E-09	1.642E-07	6.571E-06
Pb-210	∑DOSE(j):		2.203E-11	2.878E-10	3.066E-09	7.465E-08	1.629E-06	6.740E-06	4.372E-05	6.993E-04	8.370E-03
U-235	U-235	1.000E+00	3.078E-02	3.081E-02	3.086E-02	3.104E-02	3.147E-02	3.178E-02	3.210E-02	2.956E-02	7.730E-01
Pa-231	U-235	1.000E+00	4.890E-05	1.522E-04	3.602E-04	1.101E-03	3.320E-03	5.678E-03	1.208E-02	4.168E-02	1.300E-01
Ac-227	U-235	1.000E+00	2.337E-07	1.414E-06	6.861E-06	5.580E-05	4.000E-04	9.560E-04	2.848E-03	1.264E-02	7.409E-02
U-238	U-238	1.000E+00	3.103E-02	3.106E-02	3.111E-02	3.129E-02	3.173E-02	3.204E-02	3.239E-02	2.988E-02	7.571E-01

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

Summary : Off-Site Resident Farmer Colonie Site Specific for Uranium

File : OFFFARMU.RAD

Individual Nuclide Soil Concentration

Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g								
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	1.000E+00	9.975E-01	9.924E-01	9.749E-01	9.266E-01	8.808E-01	7.757E-01	4.668E-01	7.892E-02
U-234	U-238	1.000E+00	0.000E+00	2.828E-06	8.440E-06	2.764E-05	7.881E-05	1.249E-04	2.200E-04	3.972E-04	2.241E-04
U-234	∑S(j):		1.000E+00	9.975E-01	9.924E-01	9.750E-01	9.267E-01	8.809E-01	7.760E-01	4.672E-01	7.914E-02
Th-230	U-234	1.000E+00	0.000E+00	8.990E-06	2.690E-05	8.888E-05	2.600E-04	4.226E-04	7.946E-04	1.887E-03	3.244E-03
Th-230	U-238	1.000E+00	0.000E+00	1.274E-11	1.143E-10	1.255E-09	1.092E-08	2.932E-08	1.079E-07	7.021E-07	2.841E-06
Th-230	∑S(j):		0.000E+00	8.990E-06	2.690E-05	8.888E-05	2.600E-04	4.226E-04	7.947E-04	1.888E-03	3.247E-03
Ra-226	U-234	1.000E+00	0.000E+00	1.948E-09	1.749E-08	1.929E-07	1.698E-06	4.616E-06	1.749E-05	1.278E-04	7.402E-04
Ra-226	U-238	1.000E+00	0.000E+00	1.840E-15	4.953E-14	1.816E-12	4.763E-11	2.142E-10	1.595E-09	3.248E-08	4.852E-07
Ra-226	∑S(j):		0.000E+00	1.948E-09	1.749E-08	1.929E-07	1.698E-06	4.616E-06	1.750E-05	1.278E-04	7.406E-04
Pb-210	U-234	1.000E+00	0.000E+00	2.003E-11	5.314E-10	1.854E-08	4.260E-07	1.698E-06	9.775E-06	1.045E-04	6.998E-04
Pb-210	U-238	1.000E+00	0.000E+00	1.424E-17	1.134E-15	1.330E-13	9.359E-12	6.326E-11	7.502E-10	2.449E-08	4.496E-07
Pb-210	∑S(j):		0.000E+00	2.003E-11	5.314E-10	1.854E-08	4.260E-07	1.699E-06	9.775E-06	1.045E-04	7.003E-04
U-235	U-235	1.000E+00	1.000E+00	9.975E-01	9.924E-01	9.750E-01	9.267E-01	8.809E-01	7.760E-01	4.672E-01	7.914E-02
Pa-231	U-235	1.000E+00	0.000E+00	2.113E-05	6.320E-05	2.086E-04	6.081E-04	9.853E-04	1.837E-03	4.205E-03	6.134E-03
Ac-227	U-235	1.000E+00	0.000E+00	3.329E-07	2.927E-06	3.004E-05	2.183E-04	4.989E-04	1.310E-03	3.866E-03	6.069E-03
U-238	U-238	1.000E+00	1.000E+00	9.975E-01	9.924E-01	9.750E-01	9.267E-01	8.809E-01	7.760E-01	4.672E-01	7.914E-02

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

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RESRAD Report, Part II: Source Terms, Factors, and Parameters for Individual Pathways – Appendix K analysis used to determine breakthrough times for uranium, thorium, and lead.

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Source Factors for Ingrowth and Decay
Radioactivity Factors Only
Parent and Progeny Principal Radionuclide Contributions Indicated

ID(j,t) = CUMBRF(j)*S1(j,t)/S1(i,0)

Parent (i)	Product (j)	Branch Fraction*	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.999E-01	9.999E-01	9.997E-01	9.991E-01	9.972E-01
U-234	Th-230	1.000E+00	0.000E+00	9.002E-06	2.701E-05	9.001E-05	2.700E-04	4.500E-04	8.997E-04	2.696E-03	8.949E-03
U-234	Ra-226	1.000E+00	0.000E+00	1.950E-09	1.754E-08	1.947E-07	1.747E-06	4.839E-06	1.921E-05	1.679E-04	1.689E-03
U-234	Pb-210	1.000E+00	0.000E+00	2.004E-11	5.328E-10	1.870E-08	4.373E-07	1.774E-06	1.068E-05	1.363E-04	1.591E-03
U-235	U-235	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Pa-231	1.000E+00	0.000E+00	2.116E-05	6.347E-05	2.116E-04	6.345E-04	1.057E-03	2.114E-03	6.327E-03	2.094E-02
U-235	Ac-227	1.000E+00	0.000E+00	3.332E-07	2.937E-06	3.037E-05	2.258E-04	5.284E-04	1.477E-03	5.667E-03	2.028E-02
U-238	U-238	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-234	1.000E+00	0.000E+00	2.835E-06	8.505E-06	2.835E-05	8.505E-05	1.417E-04	2.835E-04	8.501E-04	2.831E-03
U-238	Th-230	1.000E+00	0.000E+00	1.276E-11	1.148E-10	1.276E-09	1.148E-08	3.189E-08	1.275E-07	1.147E-06	1.271E-05
U-238	Ra-226	1.000E+00	0.000E+00	1.652E-15	4.954E-14	1.841E-12	4.958E-11	2.291E-10	1.822E-09	4.813E-08	1.654E-06
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	1.033E-15	1.346E-13	9.704E-12	6.723E-11	8.486E-10	3.570E-08	1.509E-06

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).

Source Factors for Ingrowth and Decay
Combined Radioactivity and Leaching Factors
Parent and Progeny Principal Radionuclide Contributions Indicated

SF(j,t) = BRF(i)*S1(j,t)/S1(i,0)

Parent (i)	Product (j)	Branch Fraction*	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	1.000E+00	9.975E-01	9.924E-01	9.749E-01	9.266E-01	8.808E-01	7.757E-01	4.668E-01	7.892E-02
U-234	Th-230	1.000E+00	0.000E+00	8.990E-06	2.690E-05	8.888E-05	2.600E-04	4.226E-04	7.946E-04	1.887E-03	3.244E-03
U-234	Ra-226	1.000E+00	0.000E+00	1.948E-09	1.749E-08	1.929E-07	1.698E-06	4.616E-06	1.749E-05	1.278E-04	7.402E-04
U-234	Pb-210	1.000E+00	0.000E+00	2.003E-11	5.314E-10	1.854E-08	4.260E-07	1.698E-06	9.775E-06	1.045E-04	6.998E-04
U-235	U-235	1.000E+00	1.000E+00	9.975E-01	9.924E-01	9.750E-01	9.267E-01	8.809E-01	7.760E-01	4.672E-01	7.914E-02
U-235	Pa-231	1.000E+00	0.000E+00	2.113E-05	6.320E-05	2.086E-04	6.081E-04	9.853E-04	1.837E-03	4.205E-03	6.134E-03
U-235	Ac-227	1.000E+00	0.000E+00	3.329E-07	2.927E-06	3.004E-05	2.183E-04	4.989E-04	1.310E-03	3.866E-03	6.069E-03
U-238	U-238	1.000E+00	1.000E+00	9.975E-01	9.924E-01	9.750E-01	9.267E-01	8.809E-01	7.760E-01	4.672E-01	7.914E-02
U-238	U-234	1.000E+00	0.000E+00	2.828E-06	8.440E-06	2.764E-05	7.881E-05	1.249E-04	2.200E-04	3.972E-04	2.241E-04
U-238	Th-230	1.000E+00	0.000E+00	1.274E-11	1.143E-10	1.255E-09	1.092E-08	2.932E-08	1.079E-07	7.021E-07	2.841E-06
U-238	Ra-226	1.000E+00	0.000E+00	1.840E-15	4.953E-14	1.816E-12	4.763E-11	2.142E-10	1.595E-09	3.248E-08	4.852E-07
U-238	Pb-210	1.000E+00	0.000E+00	1.424E-17	1.134E-15	1.330E-13	9.359E-12	6.326E-11	7.502E-10	2.449E-08	4.496E-07

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
The effect of volatilization was also considered when computing the source factors for H-3 and C-14.

Parameters Used for Calculating Cover Depth and Contaminated Zone Thicknesses

Cover Erosion rate (vcv): 0.001000 m/yr
Contaminated Zone Erosion rate (vcz): 0.001000 m/yr
Water Table Drop rate (vwt): 0.001000 m/yr
Precipitation rate (Pr): 0.899000 m/yr
Cover Removal Time (Tc): 6.096E+02 yr
Overhead irrigation rate (Irr): 0.183 m/yr
Runoff coefficient (Cr): 0.200
Evapotranspiration coeff. (Ce): 0.500
Infiltration rate (In): 0.451 m/yr
Bulk soil density (rhob): 1.431 g/cm**3
Effective porosity (pe): 0.000

Radio-nuclide (i)	Distribution Coefficient Kd(i),cm**3/g	Leaching Ratio q(i)
Ac-227	4.200000E+02	3.327E-04
Pa-231	5.100000E+02	2.740E-04
Pb-210	2.700000E+02	5.174E-04
Ra-226	5.000000E+02	2.794E-04
Th-230	3.000000E+05	4.659E-07
U-234	6.200000E+01	2.249E-03
U-235	6.200000E+01	2.249E-03
U-238	6.200000E+01	2.249E-03

Time Dependence of Source Geometry

Time Dependence of Cover Depth [Cd(i,t)]

Nuclide	Cd(i,t) (meters)								
(i) t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	6.0960E-01	6.0860E-01	6.0660E-01	5.9960E-01	5.7960E-01	5.5960E-01	5.0960E-01	3.0960E-01	0.0000E+00
Pa-231	6.0960E-01	6.0860E-01	6.0660E-01	5.9960E-01	5.7960E-01	5.5960E-01	5.0960E-01	3.0960E-01	0.0000E+00
Pb-210	6.0960E-01	6.0860E-01	6.0660E-01	5.9960E-01	5.7960E-01	5.5960E-01	5.0960E-01	3.0960E-01	0.0000E+00
Ra-226	6.0960E-01	6.0860E-01	6.0660E-01	5.9960E-01	5.7960E-01	5.5960E-01	5.0960E-01	3.0960E-01	0.0000E+00
Th-230	6.0960E-01	6.0860E-01	6.0660E-01	5.9960E-01	5.7960E-01	5.5960E-01	5.0960E-01	3.0960E-01	0.0000E+00
U-234	6.0960E-01	6.0860E-01	6.0660E-01	5.9960E-01	5.7960E-01	5.5960E-01	5.0960E-01	3.0960E-01	0.0000E+00
U-235	6.0960E-01	6.0860E-01	6.0660E-01	5.9960E-01	5.7960E-01	5.5960E-01	5.0960E-01	3.0960E-01	0.0000E+00
U-238	6.0960E-01	6.0860E-01	6.0660E-01	5.9960E-01	5.7960E-01	5.5960E-01	5.0960E-01	3.0960E-01	0.0000E+00

Time Dependence of Contaminated Zone Thicknesses [T(i,t)]

Nuclide	T(i,t) (meters)								
(i) t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	1.6096E+00
Pa-231	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	1.6096E+00
Pb-210	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	1.6096E+00
Ra-226	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	1.6096E+00
Th-230	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	1.6096E+00
U-234	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	1.6096E+00
U-235	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	1.6096E+00
U-238	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	2.0000E+00	1.6096E+00

Occupancy, Cover/Depth, and Area Factors for Ground Pathway

Occupancy Factor (FO1):	0.472
Area (A):	2400. sq. meters
Initial cover depth (Cd):	0.610 meters
Initial contaminated zone thickness (T):	2.000 meters

Time Dependence of Cover/Depth Factor [FCTR_COV_DEPTH(i,t)]

Nuclide	FCTR_COV_DEPTH(i,t) (dimensionless)								
(i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	3.409E-05	3.467E-05	3.585E-05	4.030E-05	5.634E-05	7.874E-05	1.819E-04	5.176E-03	1.000E+00
Pa-231	3.748E-05	3.811E-05	3.939E-05	4.425E-05	6.167E-05	8.595E-05	1.971E-04	5.452E-03	1.000E+00
Pb-210	1.759E-07	1.803E-07	1.896E-07	2.259E-07	3.728E-07	6.151E-07	2.152E-06	3.220E-04	1.000E+00
Ra-226	6.647E-04	6.726E-04	6.888E-04	7.485E-04	9.492E-04	1.204E-03	2.180E-03	2.345E-02	1.000E+00
Th-230	7.104E-08	7.296E-08	7.698E-08	9.283E-08	1.585E-07	2.708E-07	1.032E-06	2.178E-04	1.000E+00
U-234	3.232E-08	3.323E-08	3.512E-08	4.266E-08	7.432E-08	1.295E-07	5.189E-07	1.338E-04	1.000E+00
U-235	5.494E-06	5.603E-06	5.829E-06	6.693E-06	9.935E-06	1.475E-05	3.958E-05	2.055E-03	1.000E+00
U-238	2.834E-04	2.871E-04	2.948E-04	3.232E-04	4.204E-04	5.469E-04	1.056E-03	1.465E-02	1.000E+00

Time Dependence of Area Factor [FCTR_AREA(i,t)]

Nuclide	FCTR_AREA(i,t) (dimensionless)								
(i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.170E-01
Pa-231	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.232E-01
Pb-210	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.426E-01
Ra-226	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.111E-01
Th-230	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.333E-01
U-234	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.413E-01
U-235	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.262E-01
U-238	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.124E-01

Dose Conversion and Environmental Transport Factors for the Ground Pathway (p=1)

Parent (i)	Product (j)	DCF(j,1)*	ETF(j,1,t) (dimensionless) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	4.020E-04	1.526E-08	1.569E-08	1.659E-08	2.015E-08	3.510E-08	6.116E-08	2.451E-07	6.319E-05	4.446E-01
U-234	Th-230	1.210E-03	3.355E-08	3.446E-08	3.636E-08	4.384E-08	7.488E-08	1.279E-07	4.874E-07	1.028E-04	4.408E-01
U-234	Ra-226	1.120E+01	3.139E-04	3.177E-04	3.253E-04	3.535E-04	4.483E-04	5.685E-04	1.030E-03	1.107E-02	4.303E-01
U-234	Pb-210	6.120E-03	8.306E-08	8.516E-08	8.954E-08	1.067E-07	1.761E-07	2.905E-07	1.016E-06	1.521E-04	4.452E-01
U-235	U-235	7.570E-01	2.595E-06	2.646E-06	2.753E-06	3.161E-06	4.692E-06	6.965E-06	1.869E-05	9.705E-04	4.374E-01
U-235	Pa-231	1.910E-01	1.770E-05	1.800E-05	1.861E-05	2.090E-05	2.913E-05	4.060E-05	9.310E-05	2.575E-03	4.360E-01
U-235	Ac-227	2.010E+00	1.610E-05	1.637E-05	1.693E-05	1.904E-05	2.661E-05	3.719E-05	8.590E-05	2.445E-03	4.331E-01
U-238	U-238	1.370E-01	1.338E-04	1.356E-04	1.392E-04	1.526E-04	1.986E-04	2.583E-04	4.985E-04	6.918E-03	4.309E-01
U-238	U-234	4.020E-04	1.526E-08	1.569E-08	1.659E-08	2.015E-08	3.510E-08	6.116E-08	2.451E-07	6.319E-05	4.446E-01
U-238	Th-230	1.210E-03	3.355E-08	3.446E-08	3.636E-08	4.384E-08	7.488E-08	1.279E-07	4.874E-07	1.028E-04	4.408E-01
U-238	Ra-226	1.120E+01	3.139E-04	3.177E-04	3.253E-04	3.535E-04	4.483E-04	5.685E-04	1.030E-03	1.107E-02	4.303E-01
U-238	Pb-210	6.120E-03	8.306E-08	8.516E-08	8.954E-08	1.067E-07	1.761E-07	2.905E-07	1.016E-06	1.521E-04	4.452E-01

* - The dose conversion factor units are (mrem/yr)/(pCi/g) at infinite depth and area.

Dose/Source Ratios for External Radiation from the Ground (p=1)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,1,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	6.214E-12	6.372E-12	6.702E-12	7.996E-12	1.324E-11	2.193E-11	7.740E-11	1.201E-08	1.409E-05
U-234	Th-230	1.000E+00	0.000E+00	5.703E-16	1.399E-15	5.016E-15	2.426E-14	6.689E-14	4.770E-13	2.383E-10	1.730E-06
U-234	Ra-226	1.000E+00	0.000E+00	1.628E-11	8.785E-11	8.472E-10	8.862E-09	3.014E-08	2.049E-07	1.599E-05	3.569E-03
U-234	Pb-210	1.000E+00	0.000E+00	3.956E-20	4.763E-19	1.417E-17	4.867E-16	3.140E-15	6.230E-14	9.880E-11	1.908E-06
U-234	∑DSR(j)		6.214E-12	2.265E-11	9.455E-11	8.552E-10	8.876E-09	3.017E-08	2.049E-07	1.600E-05	3.587E-03
U-235	U-235	1.000E+00	1.981E-06	2.016E-06	2.086E-06	2.353E-06	3.320E-06	4.684E-06	1.108E-05	3.462E-04	2.617E-02
U-235	Pa-231	1.000E+00	0.000E+00	1.099E-10	2.641E-10	8.809E-10	3.466E-09	7.775E-09	3.308E-08	2.087E-06	5.109E-04
U-235	Ac-227	1.000E+00	0.000E+00	2.564E-11	1.369E-10	1.272E-09	1.211E-08	3.819E-08	2.296E-07	1.918E-05	5.284E-03
U-235	∑DSR(j)		1.981E-06	2.016E-06	2.087E-06	2.355E-06	3.336E-06	4.730E-06	1.134E-05	3.675E-04	3.197E-02
U-238	U-238	1.000E+00	1.843E-05	1.863E-05	1.903E-05	2.050E-05	2.534E-05	3.134E-05	5.328E-05	4.452E-04	4.666E-03
U-238	U-234	1.000E+00	0.000E+00	2.714E-17	6.654E-17	2.381E-16	1.145E-15	3.140E-15	2.206E-14	1.023E-11	4.001E-08
U-238	Th-230	1.000E+00	0.000E+00	1.258E-21	6.983E-21	7.439E-20	1.035E-18	4.687E-18	6.508E-17	8.878E-14	1.516E-09
U-238	Ra-226	1.000E+00	0.000E+00	2.472E-17	2.942E-16	8.388E-15	2.527E-13	1.413E-12	1.876E-11	4.070E-09	2.340E-06
U-238	Pb-210	1.000E+00	0.000E+00	4.648E-26	1.211E-24	1.070E-22	1.088E-20	1.182E-19	4.806E-18	2.320E-14	1.226E-09
U-238	∑DSR(j)		1.843E-05	1.863E-05	1.903E-05	2.050E-05	2.534E-05	3.134E-05	5.328E-05	4.452E-04	4.669E-03

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

Dose/Source Ratios for Inhalation Pathway, Excluding Radon (p=2)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,2,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.081E-05
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.115E-06
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.274E-08
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.249E-08
U-234	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.297E-05
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.945E-05
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.570E-05
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.158E-05
U-235	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.167E-04
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.866E-05
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.911E-08
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.853E-09
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.353E-12
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.088E-11
U-238	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.872E-05

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

Pathway Factors for the Inhalation Pathway (radon excluded)

Area (A):	2.4000E+03 m**2	Occupancy Factor (FO2):	3.7294E-01
Area Factor (FA2):	1.4611E-01	Annual Air Intake (F12):	1.1690E+04 m**3/yr
Cover Depth [Cd(0)]:	6.0960E-01 m	Mass Loading (ASR2):	3.1400E-06 g/m**3
Contaminated Zone Thickness [T(0)]:	2.0000E+00 m	FA2 * FO2 * F12 * ASR2:	2.0001E-03 g/yr

Nuclide (i)	Depth Factor [FD(i,2,t)] (dimensionless) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	1.0000E+00
U-235 +D	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	1.0000E+00
U-238 +D	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	1.0000E+00

Dose Conversion and Environmental Transport Factors for the Inhalation Pathway, Excluding Radon (p=2)

Parent (i)	Product (j)	DCF(j,2)*	ETF(j,2,t) (g/yr)								
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.320E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.000E-03
U-234	Th-230	3.260E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.000E-03
U-234	Ra-226	8.600E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.000E-03
U-234	Pb-210	2.320E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.000E-03
U-235	U-235	1.230E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.000E-03
U-235	Pa-231	1.280E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.000E-03
U-235	Ac-227	6.720E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.000E-03
U-238	U-238	1.180E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.000E-03
U-238	U-234	1.320E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.000E-03
U-238	Th-230	3.260E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.000E-03
U-238	Ra-226	8.600E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.000E-03
U-238	Pb-210	2.320E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.000E-03

* - The dose conversion factor units are mrem/pCi.

Parameters Used for Calculating Indoor and Outdoor Radon Flux

	*Floor Material	Cover Material	Contaminated Zone
Radon Diffusion Coefficient (m**2/s)	3.000E-07	2.000E-06	2.000E-06
Total Porosity	1.000E-01	4.000E-01	3.000E-01
Volumetric Water Content	3.000E-02	5.000E-02	2.000E-01
Bulk Density (g/cm**3)	2.400E+00	1.431E+00	1.431E+00
Rn-222 Emanation Coefficient	2.500E-01	2.500E-01	2.500E-01
Initial Thickness (m)	1.500E-01	6.096E-01	2.000E+00

Building Depth Below Ground Surface *(DMFL): -1.000E+00 (m)
Negative DMFL shows building depth adjusted (if necessary) for no penetration of contaminated zone. Actual values used *(DMFLACT), m:

t=	0.0000E+00	1.0000E+00	3.0000E+00	1.0000E+01	3.0000E+01	5.0000E+01	1.0000E+02	3.0000E+02	1.0000E+03
DMFLACT=	6.0960E-01	6.0860E-01	6.0660E-01	5.9960E-01	5.7960E-01	5.5960E-01	5.0960E-01	3.0960E-01	0.0000E+00

Building indoor area factor *(FAI): 0.000E+00
FAI <= 0.0 shows calculated time-dependent value based on amount of wall area extending into the contaminated zone. Actual values used *(FAIACT):

t=	0.0000E+00	1.0000E+00	3.0000E+00	1.0000E+01	3.0000E+01	5.0000E+01	1.0000E+02	3.0000E+02	1.0000E+03
FAIACT =	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

* - Parameters are used only for indoor radon flux

Time Dependence of Outdoor Radon Flux [FLUXO(i,t)]

Nuclide	FLUXO(i,t) (pCi/m**2/s)								
(i) t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
U-238	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Time Dependence of Indoor Radon Flux [FLUXI(i,t)]

Nuclide	FLUXI(i,t) (pCi/m**2/s)								
(i) t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
U-238	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Parameters Used for Calculating Indoor and Outdoor Radon Concentration

Radon Vertical Dimension of Mixing (HMIX):	2.000E+00	(m)
Average Annual Wind Speed (WIND):	2.000E+00	(m/sec)
Building Room Height (HRM):	2.500E+00	(m)
Building Air Exchange Rate (REXG):	5.000E-01	(1/hr)

Time Dependence of Outdoor Radon Concentration [CRNO(i,t)]

Nuclide		CRNO(i,t) (pCi/m**3)								
(i)	t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234		0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
U-238		0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Time Dependence of Indoor Radon Concentration [HCONC(i,r)]

Nuclide		HCONC(i,t) (pCi/m**3)								
(i)	t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234		0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
U-238		0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Outdoor Working Levels of Radon [WLOTD(i,t)]

Nuclide		WLOTD(i,t) (WL)								
(i)	t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234		0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
U-238		0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Indoor Working Levels of Radon [WLIND(i,t)]

Nuclide		WLIND(i,t) (WL)								
(i)	t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234		0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
U-238		0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Fraction of Time Spent Outdoors (FOTD): 1.101E-01
Fraction of Time Spent Indoors (FIND): 6.571E-01

Dose/Source Ratios for Radon Pathway (p=9)
Subpathway: Outdoor and Indoor Radon Flux
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,9,t) - DSRRNW(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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

Dose/Source Ratios for Radon Pathway (p=9)
Subpathway: Indoor Radon from Water Usage
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSRRNW(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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

Transport Time Parameters for Unsaturated Zone Stratum No. 1

Stratum thickness [h(1)]:	2.890000 m
Bulk soil material density [rhob(1)]:	1.431000 g/cm**3
Effective porosity [peuz(1)]:	0.200000
Hydraulic conductivity [Khuz(1)]:	0.451100 m/yr
Total porosity [ptuz(1)]:	0.300000
Soil specific b parameter [buz(1)]:	3.500000
Saturation ratio [sruz(1)]:	1.000000

Radio-nuclide (i)	Distribution Coefficient Kduz(i,1), cm**3/g	Retardation Factor Rduz(i,1)	Transport Time Dtuz(i,1), yr
Ac-227	4.2000E+02	2.0044E+03	2.5683E+03
Pa-231	5.1000E+02	2.4337E+03	3.1183E+03
Pb-210	2.7000E+02	1.2889E+03	1.6515E+03
Ra-226	5.0000E+02	2.3860E+03	3.0572E+03
Th-230	3.0000E+05	1.4310E+06	1.8336E+06
U-234	6.2000E+01	2.9674E+02	3.8022E+02
U-235	6.2000E+01	2.9674E+02	3.8022E+02
U-238	6.2000E+01	2.9674E+02	3.8022E+02

Transport Time Parameters for Unsaturated Zone created by the Falling Water Table

Water table drop rate [vwt]:	0.001000 m/yr
Bulk soil material density [rhobaq]:	1.431000 g/cm**3
Effective porosity [peaq]:	0.200000
Hydraulic conductivity [Khaq]:	312.000000 m/yr
Total porosity [ptaq]:	0.300000
Soil specific b parameter [baq]:	3.500000
Saturation ratio [sruaq]:	0.666667

Radio-nuclide (i)	Distribution Coefficient Kdaq(i), cm**3/g	Retardation Factor Rduaq(i)	Minimum Transport Time Dtuaq(i), yr
Ac-227	4.2000E+02	3.0061E+03	2.0471E+04
Pa-231	5.1000E+02	3.6501E+03	Infinite
Pb-210	2.7000E+02	1.9328E+03	2.2008E+03
Ra-226	5.0000E+02	3.5785E+03	Infinite
Th-230	3.0000E+05	2.1465E+06	Infinite
U-234	6.2000E+01	4.4461E+02	5.7526E+01
U-235	6.2000E+01	4.4461E+02	5.7526E+01
U-238	6.2000E+01	4.4461E+02	5.7526E+01

Dilution Factor and Rise Time Parameters for Nondispersion (ND) Model

Aquifer contamination depth at well (z):	7.22917E+00	m
Depth of water intake below water table (dw):	7.11000E+00	m
Infiltration rate (In):	4.51100E-01	m/yr
Aquifer water flow rate (Vwfr):	6.24000E+00	m/yr
Hydraulic gradient (J):	2.00000E-02	
Hydraulic conductivity of aquifer (Kszh):	3.12000E+02	m/yr
Contaminated zone extent parallel to gradient (l):	1.00000E+02	m
Distance below contaminated zone to water table (h):	0.28900E+01	m
Initial thickness of uncontaminated cover (Cd):	0.60960E+00	m
Initial thickness of contaminated zone (T):	0.20000E+01	m
Effective porosity of saturated zone (pesz):	0.20000E+00	

Radio-nuclide (i)	Dilution Factor f(i)	Retardation Factor Rdsz(i)	Horizontal Transport Time Onsite Tauh(i), yr	Rise Time dt(i), yr	Decay Time Parameter 1/lamda(i),yr
Ac-227	1.000E+00	2.004E+03	6.424E+03	6.318E+03	3.141E+01
Pa-231	1.000E+00	2.434E+03	7.800E+03	7.672E+03	4.726E+04
Pb-210	1.000E+00	1.289E+03	4.131E+03	4.063E+03	3.217E+01
Ra-226	1.000E+00	2.386E+03	7.647E+03	7.521E+03	2.308E+03
Th-230	1.000E+00	1.431E+06	4.587E+06	4.511E+06	1.111E+05
U-234	1.000E+00	2.967E+02	9.511E+02	9.354E+02	3.527E+05
U-235	1.000E+00	2.967E+02	9.511E+02	9.354E+02	1.015E+09
U-238	1.000E+00	2.967E+02	9.511E+02	9.354E+02	6.446E+09

Primary Parameters Used for Calculating Water/Soil
Concentration Ratios for Groundwater Pathway Segment

Model used: Nondispersion (ND)
Bulk soil density in contaminated zone (rhob): 1.431 g/cm**3

Radio-nuclide (i)	Dilution Factor f(i)	Retardation Factor Rdcz(i)	Breakthrough Time Chain year	Breakthrough Time Single Nuclide Dt(i), yr	Rise Time dt(i), yr
Ac-227	1.000E+00	3.006E+03	4.377E+02	2.304E+04	6.318E+03
Pa-231	1.000E+00	3.650E+03	4.377E+02	Infinite	7.672E+03
Pb-210	1.000E+00	1.933E+03	4.377E+02	3.852E+03	4.063E+03
Ra-226	1.000E+00	3.579E+03	4.377E+02	Infinite	7.521E+03
Th-230	1.000E+00	2.147E+06	4.377E+02	Infinite	4.511E+06
U-234	1.000E+00	4.446E+02	4.377E+02	4.377E+02	9.354E+02
U-235	1.000E+00	4.446E+02	4.377E+02	4.377E+02	9.354E+02
U-238	1.000E+00	4.446E+02	4.377E+02	4.377E+02	9.354E+02

Water/Soil Concentration Ratios [WSR(j,1,t)] for Groundwater Pathway Segment

Parent (i)	Product (j)	Branch Fraction*	WSR(j,1,t) in (pCi/L)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.804E+00
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.628E-06
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.305E-04
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.114E-04
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.818E+00
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.134E-03
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.576E-03
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.818E+00
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.364E-02
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.131E-09
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.694E-07
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.271E-07

Water/Soil Concentration Ratios [WSR(j,2,t)] for Surface Water Pathway Segment

Watershed Area (Aw) = 1.0000E+06 m**2
Contaminated Zone Area (A) = 2.4000E+03 m**2
Dilution Factor (f') = 2.4000E-03
Soil Density (rhob) = 1.4310E+00 kg/m**3

Parent (i)	Product (j)	Branch Fraction*	WSR(j,2,t) in (pCi/L)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.153E-02
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.307E-09
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.133E-07
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.074E-07
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.156E-02
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.921E-06
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.098E-05
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.156E-02
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.273E-05
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.471E-11
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.467E-10
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.025E-09

Storage Times For Contaminated Foodstuffs

k	Food Item	STOR_T(k), days
1	non-leafy plants	14
2	leafy plants	1
3	milk	1
4	meat	20
5	fish	7
6	crustacea	7
7	well water	1
8	surface water	1
9	livestock fodder	0

Storage Time Ingrowth and Decay Factors

Storage Time for k'th Foodstuff: t = STOR_T(k), days

Parent (i)	Product (j)	Branch Fraction	STOR_ID(i,j,t) = CONCE(i,j,t)/CONCE(i,i,0) t=	1.400E+01	1.000E+00	1.000E+00	2.000E+01	7.000E+00	7.000E+00	1.000E+00	1.000E+00	0.000E+00
Ac-227	Ac-227	1.000E+00		9.988E-01	9.999E-01	9.999E-01	9.983E-01	9.994E-01	9.994E-01	9.999E-01	9.999E-01	1.000E+00
Pa-231	Pa-231	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
Pa-231	Ac-227	1.000E+00		1.219E-03	8.716E-05	8.716E-05	1.742E-03	6.099E-04	6.099E-04	8.716E-05	8.716E-05	1.000E+00
Pb-210	Pb-210	1.000E+00		9.988E-01	9.999E-01	9.999E-01	9.983E-01	9.994E-01	9.994E-01	9.999E-01	9.999E-01	1.000E+00
Ra-226	Ra-226	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
Ra-226	Pb-210	1.000E+00		1.191E-03	8.510E-05	8.510E-05	1.701E-03	5.955E-04	5.955E-04	8.510E-05	8.510E-05	1.000E+00
Th-230	Th-230	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
Th-230	Ra-226	1.000E+00		1.661E-05	1.186E-06	1.186E-06	2.372E-05	8.303E-06	8.303E-06	1.186E-06	1.186E-06	1.000E+00
Th-230	Pb-210	1.000E+00		9.888E-09	5.047E-11	5.047E-11	2.018E-08	2.472E-09	2.472E-09	5.047E-11	5.047E-11	1.000E+00
U-234	U-234	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Th-230	1.000E+00		3.450E-07	2.465E-08	2.465E-08	4.929E-07	1.725E-07	1.725E-07	2.465E-08	2.465E-08	1.000E+00
U-234	Ra-226	1.000E+00		2.865E-12	1.444E-14	1.444E-14	5.846E-12	7.160E-13	7.160E-13	1.444E-14	1.444E-14	1.000E+00
U-234	Pb-210	1.000E+00		1.064E-15	2.613E-17	2.613E-17	3.205E-15	2.317E-17	2.317E-17	2.613E-17	2.613E-17	1.000E+00
U-235	U-235	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Pa-231	1.000E+00		8.110E-07	5.793E-08	5.793E-08	1.159E-06	4.055E-07	4.055E-07	5.793E-08	5.793E-08	1.000E+00
U-235	Ac-227	1.000E+00		4.946E-10	2.524E-12	2.524E-12	1.009E-09	1.237E-10	1.237E-10	2.524E-12	2.524E-12	1.000E+00
U-238	U-238	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-234	1.000E+00		1.087E-07	7.762E-09	7.762E-09	1.552E-07	5.433E-08	5.433E-08	7.762E-09	7.762E-09	1.000E+00
U-238	Th-230	1.000E+00		1.876E-14	1.746E-16	1.746E-16	3.828E-14	4.731E-15	4.731E-15	1.746E-16	1.746E-16	1.000E+00
U-238	Ra-226	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+00
U-238	Pb-210	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+00

CONCE(i,j,t)/CONCE(i,i,0) is the concentration ratio of Product(j) at time t to Parent(i) at start of storage time.

Storage Time Correction Factors
Drinking Water from Well and/or Surface
Harvest Time = t - 2.74E-03 yr; Consumption Time = t yr

Parent (i)	Product (j)	Branch Fraction*	CFWW(j,t,1)# t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Th-230	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.045E+00
U-234	Ra-226	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Pb-210	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	U-235	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Pa-231	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Ac-227	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-238	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-234	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Th-230	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.055E+00
U-238	Ra-226	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Pb-210	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors
Irrigation Water for Nonleafy Plants from Well and/or Surface
Harvest Time = t - 4.11E-02 yr; Consumption Time = t - 3.83E-02 yr

Parent (i)	Product (j)	Branch Fraction*	CFWW(j,t,2)# t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Th-230	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.045E+00
U-234	Ra-226	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Pb-210	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	U-235	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Pa-231	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Ac-227	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-238	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-234	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Th-230	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.055E+00
U-238	Ra-226	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Pb-210	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors

Irrigation Water for Leafy Plants from Well and/or Surface

Harvest Time = t - 5.48E-03 yr; Consumption Time = t - 2.74E-03 yr

Parent	Product	Branch		CFWW(j,t,3)#								
(i)	(j)	Fraction*	t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Th-230	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.045E+00
U-234	Ra-226	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Pb-210	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	U-235	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Pa-231	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Ac-227	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-238	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-234	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Th-230	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.055E+00
U-238	Ra-226	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Pb-210	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors

Irrigation Water for Livestock (Milk) Fodder from Well and/or Surface

Harvest Time = t - 5.48E-03 yr; Consumption Time = t - 2.74E-03 yr

Parent	Product	Branch		CFWW(j,t,5)#								
(i)	(j)	Fraction*	t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Th-230	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.045E+00
U-234	Ra-226	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Pb-210	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	U-235	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Pa-231	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Ac-227	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-238	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-234	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Th-230	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.055E+00
U-238	Ra-226	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Pb-210	1.000E+00		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors

Irrigation Water for Livestock (Meat) Fodder from Well and/or Surface

Harvest Time = t - 5.75E-02 yr; Consumption Time = t - 5.48E-02 yr

Parent (i)	Product (j)	Branch Fraction*	CFWW(j,t,7)# t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Th-230	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.045E+00
U-234	Ra-226	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Pb-210	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	U-235	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Pa-231	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Ac-227	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-238	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-234	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Th-230	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.055E+00
U-238	Ra-226	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Pb-210	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors

Livestock (Milk) Water from Well and/or Surface

Harvest Time = t - 5.48E-03 yr; Consumption Time = t - 2.74E-03 yr

Parent (i)	Product (j)	Branch Fraction*	CFWW(j,t,4)# t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Th-230	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.045E+00
U-234	Ra-226	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Pb-210	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	U-235	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Pa-231	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Ac-227	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-238	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-234	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Th-230	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.055E+00
U-238	Ra-226	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Pb-210	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors

Livestock (Meat) Water from Well and/or Surface

Harvest Time = t - 5.75E-02 yr; Consumption Time = t - 5.48E-02 yr

Parent	Product	Branch	CFWW(j,t,6)#								
(i)	(j)	Fraction*	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Th-230	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.045E+00
U-234	Ra-226	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Pb-210	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	U-235	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Pa-231	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Ac-227	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-238	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-234	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Th-230	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.055E+00
U-238	Ra-226	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Pb-210	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors for Nonleafy Plants

Harvest Time = t - 3.83E-02 yr; Consumption Time = t yr

Parent	Product	Branch	CF3(j,1,t)#								
(i)	(j)	Fraction*	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Th-230	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.604E+00
U-234	Ra-226	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Pb-210	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.996E-01
U-235	U-235	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Pa-231	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.001E+00
U-235	Ac-227	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.999E-01
U-238	U-238	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-234	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Th-230	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.728E+00
U-238	Ra-226	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Pb-210	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.996E-01

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors for Leafy Plants

Harvest Time = t - 2.74E-03 yr; Consumption Time = t yr

Parent (i)	Product (j)	Branch Fraction*	CF3(j,2,t)# t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Th-230	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.043E+00
U-234	Ra-226	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Pb-210	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	U-235	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Pa-231	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Ac-227	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-238	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-234	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Th-230	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.052E+00
U-238	Ra-226	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Pb-210	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors for Livestock (Meat) Fodder

Harvest Time = t - 5.48E-02 yr; Consumption Time = t - 5.48E-02 yr

Parent (i)	Product (j)	Branch Fraction*	CFLF(j,1,t)# t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Th-230	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Ra-226	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Pb-210	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	U-235	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Pa-231	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Ac-227	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-238	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-234	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Th-230	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Ra-226	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Pb-210	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors for Livestock (Milk) Fodder

Harvest Time = t - 2.74E-03 yr; Consumption Time = t - 2.74E-03 yr

Parent (i)	Product (j)	Branch Fraction*	CFLF(j,2,t)# t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Th-230	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Ra-226	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Pb-210	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	U-235	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Pa-231	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Ac-227	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-238	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-234	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Th-230	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Ra-226	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Pb-210	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors for Meat

Harvest Time = t - 5.48E-02 yr; Consumption Time = t yr

Parent (i)	Product (j)	Branch Fraction*	CF45(j,1,t)# t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Th-230	1.000E+00	1.000E+00	1.492E+00	1.157E+00	1.046E+00	1.015E+00	1.009E+00	1.004E+00	1.001E+00	1.001E+00
U-234	Ra-226	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Pb-210	1.000E+00	1.000E+00	1.873E+00	1.283E+00	1.087E+00	1.032E+00	1.021E+00	1.014E+00	1.009E+00	1.003E+00
U-235	U-235	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Pa-231	1.000E+00	1.000E+00	1.001E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Ac-227	1.000E+00	1.000E+00	1.179E+02	3.929E+01	1.315E+01	5.856E+00	4.440E+00	3.441E+00	2.892E+00	1.571E+00
U-238	U-238	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-234	1.000E+00	1.000E+00	1.058E+00	1.019E+00	1.006E+00	1.002E+00	1.001E+00	1.001E+00	1.000E+00	1.000E+00
U-238	Th-230	1.000E+00	1.000E+00	2.013E+00	1.318E+00	1.093E+00	1.030E+00	1.018E+00	1.009E+00	1.002E+00	1.002E+00
U-238	Ra-226	1.000E+00	1.000E+00	1.001E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Pb-210	1.000E+00	1.000E+00	2.166E+00	1.376E+00	1.115E+00	1.042E+00	1.027E+00	1.016E+00	1.010E+00	1.003E+00

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors for Milk
Harvest Time = t - 2.74E-03 yr; Consumption Time = t yr

Parent (i)	Product (j)	Branch Fraction*	CF45(j,2,t)# t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Th-230	1.000E+00	1.000E+00	1.823E+00	1.273E+00	1.081E+00	1.026E+00	1.015E+00	1.007E+00	1.002E+00	1.002E+00
U-234	Ra-226	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Pb-210	1.000E+00	1.000E+00	1.111E+00	1.037E+00	1.012E+00	1.004E+00	1.003E+00	1.002E+00	1.001E+00	1.001E+00
U-235	U-235	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Pa-231	1.000E+00	1.000E+00	1.082E+00	1.027E+00	1.008E+00	1.003E+00	1.002E+00	1.001E+00	1.000E+00	1.001E+00
U-235	Ac-227	1.000E+00	1.000E+00	1.006E+00	1.002E+00	1.001E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.999E-01
U-238	U-238	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-234	1.000E+00	1.000E+00	1.003E+00	1.001E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Th-230	1.000E+00	1.000E+00	2.650E+00	1.547E+00	1.163E+00	1.053E+00	1.031E+00	1.015E+00	1.004E+00	1.005E+00
U-238	Ra-226	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Pb-210	1.000E+00	1.000E+00	1.147E+00	1.050E+00	1.015E+00	1.006E+00	1.004E+00	1.002E+00	1.001E+00	1.001E+00

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors for Fish & Crustacea
Harvest Time = t - 1.92E-02 yr; Consumption Time = t yr

Parent (i)	Product (j)	Branch Fraction*	CFF(j,1,t)# t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Th-230	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.032E+00
U-234	Ra-226	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-234	Pb-210	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.995E-01
U-235	U-235	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Pa-231	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-235	Ac-227	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.998E-01
U-238	U-238	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	U-234	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Th-230	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.038E+00
U-238	Ra-226	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
U-238	Pb-210	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.995E-01

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Area and Depth Factors for Plant (p=3), Meat (p=4), and Milk (p=5) Pathways
Root Uptake from Contaminated Soil (q=1)

Area Factor for Plant Foods [FA(3)] = 1.00

Nuclide	Depth Factor FD(i,1,t) (dimensionless)								
(i) t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	3.2267E-01	3.2378E-01	3.2600E-01	3.3378E-01	3.5600E-01	3.7822E-01	4.3378E-01	6.5600E-01	1.0000E+00
Pa-231	3.2267E-01	3.2378E-01	3.2600E-01	3.3378E-01	3.5600E-01	3.7822E-01	4.3378E-01	6.5600E-01	1.0000E+00
Pb-210	3.2267E-01	3.2378E-01	3.2600E-01	3.3378E-01	3.5600E-01	3.7822E-01	4.3378E-01	6.5600E-01	1.0000E+00
Ra-226	3.2267E-01	3.2378E-01	3.2600E-01	3.3378E-01	3.5600E-01	3.7822E-01	4.3378E-01	6.5600E-01	1.0000E+00
Th-230	3.2267E-01	3.2378E-01	3.2600E-01	3.3378E-01	3.5600E-01	3.7822E-01	4.3378E-01	6.5600E-01	1.0000E+00
U-234	3.2267E-01	3.2378E-01	3.2600E-01	3.3378E-01	3.5600E-01	3.7822E-01	4.3378E-01	6.5600E-01	1.0000E+00
U-235	3.2267E-01	3.2378E-01	3.2600E-01	3.3378E-01	3.5600E-01	3.7822E-01	4.3378E-01	6.5600E-01	1.0000E+00
U-238	3.2267E-01	3.2378E-01	3.2600E-01	3.3378E-01	3.5600E-01	3.7822E-01	4.3378E-01	6.5600E-01	1.0000E+00

Area and Depth Factors for Plant (p=3), Meat (p=4), and Milk (p=5) Pathways
Foliar Uptake from Contaminated Dust (q=2)

Area Factor for Plant Foods [FA(3)] = 1.00

Nuclide	Depth Factor FD(i,2,t) (dimensionless)								
(i) t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	1.0000E+00
Pa-231	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	1.0000E+00
Pb-210	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	1.0000E+00
Ra-226	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	1.0000E+00
Th-230	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	1.0000E+00
U-234	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	1.0000E+00
U-235	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	1.0000E+00
U-238	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	1.0000E+00

Area and Depth Factors for Plant (p=3), Meat (p=4), and Milk (p=5) Pathways
Ditch Irrigation (q=3)

Area Factor for Plant Foods [FA(3)] = 1.00

Nuclide	Depth Factor FD(i,3,t) (dimensionless)								
(i) t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00
Pa-231	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00
Pb-210	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00
Ra-226	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00
Th-230	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00
U-234	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00
U-235	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00
U-238	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00

Area and Depth Factors for Plant (p=3), Meat (p=4), and Milk (p=5) Pathways
Overhead Irrigation (q=4)

Area Factor for Plant Foods [FA(3)] = 1.00

The Depth Factor Value
FD(i,p,q,t) = 1.0000E+00
is applicable for all radionuclides(i) and times(t).

Area and Depth Factors for Meat (p=4) and Milk (p=5) Pathways
Transfer from Livestock Water (q=5) and Soil (q=6) Intake

Area Factor for Meat and Milk [FA(p),p=4,5] = 1.00

The livestock water subpathway (q=5) and livestock soil intake subpathway (q=6)
occur only for the meat (p=4) and milk (p=5) pathways.

Area and Depth Factors for Meat (p=4) and Milk (p=5) Pathways
Transfer from Livestock Water (q=5) and Soil (q=6) Intake

Area Factor for Meat and Milk [FA(p),p=4,5] = 1.00

The livestock water subpathway (q=5) and livestock soil intake subpathway (q=6) occur only for the meat (p=4) and milk (p=5) pathways.

Dose Conversion and Environmental Transport Factors for the Plant Food Pathway (p=3)
Subpathway: Root Uptake from Contaminated Soil (q=1)

Parent (i)	Product (j)	DCF(j,3)*	ETF(j,3,1,t) (g/yr) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	2.830E-04	1.076E+02	1.077E+02	1.079E+02	1.085E+02	1.100E+02	1.111E+02	1.122E+02	1.021E+02	2.632E+01
U-234	Th-230	5.480E-04	0.000E+00	4.072E-04	1.189E-03	3.976E-03	1.237E-02	2.134E-02	4.600E-02	1.651E-01	4.327E-01
U-234	Ra-226	1.330E-03	0.000E+00	3.155E-06	2.978E-05	3.413E-04	3.219E-03	9.303E-03	4.046E-02	4.472E-01	3.949E+00
U-234	Pb-210	7.270E-03	0.000E+00	1.099E-08	2.535E-07	8.515E-06	2.047E-04	8.640E-04	5.687E-03	9.177E-02	9.366E-01
U-235	U-235	2.670E-04	1.076E+02	1.077E+02	1.079E+02	1.085E+02	1.100E+02	1.111E+02	1.123E+02	1.022E+02	2.640E+01
U-235	Pa-231	1.060E-02	0.000E+00	8.902E-03	2.726E-02	9.264E-02	2.886E-01	4.968E-01	1.063E+00	3.679E+00	8.183E+00
U-235	Ac-227	1.480E-02	0.000E+00	4.278E-05	3.394E-04	3.416E-03	2.615E-02	6.331E-02	1.904E-01	8.487E-01	2.031E+00
U-238	U-238	2.690E-04	1.076E+02	1.077E+02	1.079E+02	1.085E+02	1.100E+02	1.111E+02	1.123E+02	1.022E+02	2.640E+01
U-238	U-234	2.830E-04	0.000E+00	3.053E-04	9.176E-04	3.077E-03	9.357E-03	1.575E-02	3.182E-02	8.690E-02	7.473E-02
U-238	Th-230	5.480E-04	0.000E+00	6.029E-10	5.129E-09	5.640E-08	5.200E-07	1.482E-06	6.249E-06	6.145E-05	3.790E-04
U-238	Ra-226	1.330E-03	0.000E+00	2.887E-12	8.345E-11	3.203E-09	9.018E-08	4.314E-07	3.687E-06	1.137E-04	2.589E-03
U-238	Pb-210	7.270E-03	0.000E+00	8.232E-15	5.558E-13	6.164E-11	4.513E-09	3.224E-08	4.369E-07	2.152E-05	6.017E-04

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Plant Food Pathway (p=3)
Subpathway: Foliar Uptake from Contaminated Dust (q=2)

Parent (i)	Product (j)	DCF(j,3)*	ETF(j,3,2,t) (g/yr) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.318E-02
U-234	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.418E-04
U-234	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.236E-04
U-234	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.169E-04
U-235	U-235	2.670E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.322E-02
U-235	Pa-231	1.060E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.025E-03
U-235	Ac-227	1.480E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.014E-03
U-238	U-238	2.690E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.322E-02
U-238	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.742E-05
U-238	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.745E-07
U-238	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.103E-08
U-238	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.509E-08

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Plant Food Pathway (p=3)

Subpathway: Ditch Irrigation (q=3)

Parent (i)	Product (j)	DCF(j,3)*	ETF(j,3,3,t) * SF(j,t) (g/yr) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.243E-01
U-234	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.225E-07
U-234	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.754E-05
U-234	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.956E-05
U-235	U-235	2.670E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.250E-01
U-235	Pa-231	1.060E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.725E-04
U-235	Ac-227	1.480E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.143E-04
U-238	U-238	2.690E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.250E-01
U-238	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.369E-04
U-238	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.230E-10
U-238	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.013E-07
U-238	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.988E-08

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Plant Food Pathway (p=3)

Subpathway: Overhead Irrigation (q=4)

Parent (i)	Product (j)	DCF(j,3)*	ETF(j,3,4,t) * SF(j,t) (g/yr) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.180E+02
U-234	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.456E-04
U-234	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.640E-03
U-234	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.399E-02
U-235	U-235	2.670E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.189E+02
U-235	Pa-231	1.060E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.738E-01
U-235	Ac-227	1.480E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.029E-01
U-238	U-238	2.690E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.189E+02
U-238	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.028E-01
U-238	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.092E-07
U-238	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.783E-05
U-238	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.825E-05

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Meat Pathway (p=4)

Subpathway: Fodder Root Uptake from Contaminated Soil (q=1)

Parent (i)	Product (j)	DCF(j,4)*	ETF(j,4,1,t) (g/yr)								
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	2.830E-04	4.839E-01	4.843E-01	4.851E-01	4.880E-01	4.947E-01	4.995E-01	5.046E-01	4.592E-01	1.184E-01
U-234	Th-230	5.480E-04	0.000E+00	7.241E-07	1.758E-06	5.445E-06	1.654E-05	2.841E-05	6.102E-05	2.186E-04	5.723E-04
U-234	Ra-226	1.330E-03	0.000E+00	3.977E-08	3.878E-07	4.493E-06	4.250E-05	1.229E-04	5.349E-04	5.913E-03	5.223E-02
U-234	Pb-210	7.270E-03	0.000E+00	1.448E-10	2.970E-09	9.345E-08	2.198E-06	9.233E-06	6.056E-05	9.753E-04	9.948E-03
U-235	U-235	2.670E-04	4.839E-01	4.843E-01	4.851E-01	4.880E-01	4.947E-01	4.996E-01	5.048E-01	4.596E-01	1.187E-01
U-235	Pa-231	1.060E-02	0.000E+00	5.709E-04	1.785E-03	6.107E-03	1.906E-02	3.283E-02	7.025E-02	2.433E-01	5.411E-01
U-235	Ac-227	1.480E-02	0.000E+00	1.002E-06	3.189E-06	1.151E-05	4.002E-05	7.377E-05	1.724E-04	6.470E-04	1.477E-03
U-238	U-238	2.690E-04	4.839E-01	4.843E-01	4.851E-01	4.880E-01	4.947E-01	4.996E-01	5.048E-01	4.596E-01	1.187E-01
U-238	U-234	2.830E-04	0.000E+00	1.373E-06	4.126E-06	1.383E-05	4.207E-05	7.081E-05	1.431E-04	3.908E-04	3.360E-04
U-238	Th-230	5.480E-04	0.000E+00	1.308E-12	8.348E-12	7.986E-11	7.038E-10	1.987E-09	8.318E-09	8.142E-08	5.014E-07
U-238	Ra-226	1.330E-03	0.000E+00	3.552E-14	1.078E-12	4.207E-11	1.190E-09	5.698E-09	4.873E-08	1.503E-06	3.423E-05
U-238	Pb-210	7.270E-03	0.000E+00	1.120E-16	6.674E-15	6.836E-13	4.863E-11	3.454E-10	4.658E-09	2.288E-07	6.392E-06

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Meat Pathway (p=4)

Subpathway: Fodder Foliar Uptake from Contaminated Dust (q=2)

Parent (i)	Product (j)	DCF(j,4)*	ETF(j,4,2,t) (g/yr)								
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.360E-04
U-234	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.853E-06
U-234	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.509E-06
U-234	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.926E-06
U-235	U-235	2.670E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.367E-04
U-235	Pa-231	1.060E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.698E-04
U-235	Ac-227	1.480E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.536E-06
U-238	U-238	2.690E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.367E-04
U-238	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.701E-07
U-238	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.499E-09
U-238	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.267E-09
U-238	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.165E-09

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Meat Pathway (p=4)

Subpathway: Ditch Irrigation (q=3)

Parent (i)	Product (j)	DCF(j,4)*	ETF(j,4,3,t) * SF(j,t) (g/yr) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.590E-04
U-234	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.692E-10
U-234	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.426E-07
U-234	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.739E-07
U-235	U-235	2.670E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.609E-04
U-235	Pa-231	1.060E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.336E-05
U-235	Ac-227	1.480E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.497E-08
U-238	U-238	2.690E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.609E-04
U-238	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.871E-06
U-238	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.026E-12
U-238	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.739E-09
U-238	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.530E-10

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Meat Pathway (p=4)

Subpathway: Overhead Irrigation (q=4)

Parent (i)	Product (j)	DCF(j,4)*	ETF(j,4,4,t) * SF(j,t) (g/yr) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.694E+00
U-234	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.764E-06
U-234	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.549E-04
U-234	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.892E-04
U-235	U-235	2.670E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.710E+00
U-235	Pa-231	1.060E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.205E-02
U-235	Ac-227	1.480E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.439E-04
U-238	U-238	2.690E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.710E+00
U-238	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.616E-02
U-238	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.022E-08
U-238	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.388E-07
U-238	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.190E-06

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Meat Pathway (p=4)

Subpathway: Livestock Water (q=5)

Parent (i)	Product (j)	DCF(j,4)*	ETF(j,4,5,t) * SF(j,t) (g/yr)								
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.316E+00
U-234	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.514E-06
U-234	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.248E-04
U-234	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.501E-04
U-235	U-235	2.670E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.331E+00
U-235	Pa-231	1.060E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.728E-02
U-235	Ac-227	1.480E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.145E-04
U-238	U-238	2.690E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.331E+00
U-238	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.509E-02
U-238	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.543E-09
U-238	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.766E-07
U-238	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.111E-06

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Milk Pathway (p=5)

Subpathway: Fodder Root Uptake from Contaminated Soil (q=1)

Parent (i)	Product (j)	DCF(j,5)*	ETF(j,5,1,t) (g/yr) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	2.830E-04	7.133E+00	7.139E+00	7.152E+00	7.193E+00	7.292E+00	7.364E+00	7.439E+00	6.770E+00	1.745E+00
U-234	Th-230	5.480E-04	0.000E+00	3.899E-07	8.219E-07	2.363E-06	6.999E-06	1.196E-05	2.558E-05	9.138E-05	2.391E-04
U-234	Ra-226	1.330E-03	0.000E+00	3.697E-07	3.355E-06	3.793E-05	3.563E-04	1.029E-03	4.473E-03	4.941E-02	4.363E-01
U-234	Pb-210	7.270E-03	0.000E+00	3.158E-10	7.924E-09	2.766E-07	6.733E-06	2.848E-05	1.878E-04	3.034E-03	3.097E-02
U-235	U-235	2.670E-04	7.133E+00	7.139E+00	7.152E+00	7.194E+00	7.293E+00	7.365E+00	7.441E+00	6.775E+00	1.750E+00
U-235	Pa-231	1.060E-02	0.000E+00	5.440E-06	1.558E-05	5.170E-05	1.599E-04	2.750E-04	5.876E-04	2.033E-03	4.520E-03
U-235	Ac-227	1.480E-02	0.000E+00	7.944E-08	7.032E-07	7.388E-06	5.728E-05	1.390E-04	4.188E-04	1.869E-03	4.472E-03
U-238	U-238	2.690E-04	7.133E+00	7.139E+00	7.152E+00	7.194E+00	7.293E+00	7.365E+00	7.441E+00	6.775E+00	1.750E+00
U-238	U-234	2.830E-04	0.000E+00	2.024E-05	6.083E-05	2.039E-04	6.202E-04	1.044E-03	2.109E-03	5.760E-03	4.953E-03
U-238	Th-230	5.480E-04	0.000E+00	8.010E-13	4.239E-12	3.587E-11	3.016E-10	8.428E-10	3.501E-09	3.408E-08	2.095E-07
U-238	Ra-226	1.330E-03	0.000E+00	3.483E-13	9.493E-12	3.570E-10	9.992E-09	4.775E-08	4.077E-07	1.256E-05	2.860E-04
U-238	Pb-210	7.270E-03	0.000E+00	2.311E-16	1.709E-14	1.991E-12	1.481E-10	1.062E-09	1.442E-08	7.113E-07	1.990E-05

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Milk Pathway (p=5)

Subpathway: Fodder Foliar Uptake from Contaminated Dust (q=2)

Parent (i)	Product (j)	DCF(j,5)*	ETF(j,5,2,t) (g/yr) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.479E-03
U-234	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.192E-06
U-234	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.438E-05
U-234	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.543E-05
U-235	U-235	2.670E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.489E-03
U-235	Pa-231	1.060E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.254E-06
U-235	Ac-227	1.480E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.918E-06
U-238	U-238	2.690E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.489E-03
U-238	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.877E-06
U-238	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.044E-09
U-238	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.565E-08
U-238	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.912E-09

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Milk Pathway (p=5)

Subpathway: Ditch Irrigation (q=3)

Parent (i)	Product (j)	DCF(j,5)*	ETF(j,5,3,t) * SF(j,t) (g/yr)								
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.715E-03
U-234	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.579E-10
U-234	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.041E-06
U-234	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.557E-07
U-235	U-235	2.670E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.743E-03
U-235	Pa-231	1.060E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.793E-07
U-235	Ac-227	1.480E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.085E-07
U-238	U-238	2.690E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.743E-03
U-238	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.758E-05
U-238	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.233E-13
U-238	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.453E-08
U-238	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.728E-09

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Milk Pathway (p=5)

Subpathway: Overhead Irrigation (q=4)

Parent (i)	Product (j)	DCF(j,5)*	ETF(j,5,4,t) * SF(j,t) (g/yr)								
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.394E+01
U-234	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.469E-06
U-234	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.801E-03
U-234	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.847E-03
U-235	U-235	2.670E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.417E+01
U-235	Pa-231	1.060E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.068E-04
U-235	Ac-227	1.480E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.665E-03
U-238	U-238	2.690E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.417E+01
U-238	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.383E-01
U-238	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.814E-09
U-238	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.846E-06
U-238	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.731E-06

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Milk Pathway (p=5)

Subpathway: Livestock Water (q=5)

Parent (i)	Product (j)	DCF(j,5)*	ETF(j,5,5,t) * SF(j,t) (g/yr)								
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.030E+01
U-234	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.185E-06
U-234	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.825E-03
U-234	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.868E-04
U-235	U-235	2.670E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.041E+01
U-235	Pa-231	1.060E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.913E-04
U-235	Ac-227	1.480E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.279E-03
U-238	U-238	2.690E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.041E+01
U-238	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.144E-01
U-238	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.271E-09
U-238	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.767E-06
U-238	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.791E-06

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Fish Pathway (p=6)

Parent (i)	Product (j)	DCF(j,6)*	ETF(j,6,t) * SF(j,t) (g/yr)								
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	U-235	2.670E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	Pa-231	1.060E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	Ac-227	1.480E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	U-238	2.690E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Drinking Water Pathway (p=7)

Parent (i)	Product (j)	DCF(j,7)*	ETF(j,7,t) * SF(j,t) (g/yr)								
		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.299E+03
U-234	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.314E-03
U-234	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.246E-02
U-234	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.012E-01
U-235	U-235	2.670E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.305E+03
U-235	Pa-231	1.060E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.978E+00
U-235	Ac-227	1.480E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.190E+00
U-238	U-238	2.690E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.305E+03
U-238	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.526E+00
U-238	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.094E-06
U-238	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.289E-04
U-238	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.043E-04

* - The dose conversion factor units are mrem/pCi.

Dose/Source Ratios for Internal Radiation from Ingestion of Plant Foods (p=3)
Subpathway: Root Uptake from Contaminated Soil (q=1)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,3,1,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	3.047E-02	3.049E-02	3.055E-02	3.072E-02	3.114E-02	3.145E-02	3.176E-02	2.889E-02	7.440E-03
U-234	Th-230	1.000E+00	0.000E+00	3.299E-07	7.592E-07	2.290E-06	6.895E-06	1.182E-05	2.535E-05	9.068E-05	2.372E-04
U-234	Ra-226	1.000E+00	0.000E+00	1.003E-08	5.452E-08	5.015E-07	4.430E-06	1.263E-05	5.440E-05	5.969E-04	5.256E-03
U-234	Pb-210	1.000E+00	0.000E+00	2.760E-10	2.939E-09	7.153E-08	1.561E-06	6.458E-06	4.189E-05	6.698E-04	6.813E-03
U-234	∑DSR(j)		3.047E-02	3.049E-02	3.055E-02	3.073E-02	3.116E-02	3.148E-02	3.188E-02	3.025E-02	1.975E-02
U-235	U-235	1.000E+00	2.874E-02	2.877E-02	2.882E-02	2.899E-02	2.939E-02	2.967E-02	2.997E-02	2.728E-02	7.039E-03
U-235	Pa-231	1.000E+00	0.000E+00	1.429E-04	3.379E-04	1.032E-03	3.112E-03	5.323E-03	1.133E-02	3.907E-02	8.674E-02
U-235	Ac-227	1.000E+00	0.000E+00	1.389E-06	6.791E-06	5.550E-05	3.985E-04	9.528E-04	2.839E-03	1.259E-02	3.005E-02
U-235	∑DSR(j)		2.874E-02	2.891E-02	2.916E-02	3.008E-02	3.290E-02	3.595E-02	4.414E-02	7.894E-02	1.238E-01
U-238	U-238	1.000E+00	2.896E-02	2.899E-02	2.904E-02	2.920E-02	2.961E-02	2.989E-02	3.020E-02	2.749E-02	7.092E-03
U-238	U-234	1.000E+00	0.000E+00	1.297E-07	3.031E-07	9.146E-07	2.693E-06	4.502E-06	9.050E-06	2.462E-05	2.113E-05
U-238	Th-230	1.000E+00	0.000E+00	7.479E-13	3.837E-12	3.411E-11	2.948E-10	8.290E-10	3.460E-09	3.379E-08	2.078E-07
U-238	Ra-226	1.000E+00	0.000E+00	1.495E-14	1.809E-13	4.950E-12	1.262E-10	5.917E-10	4.981E-09	1.519E-07	3.446E-06
U-238	Pb-210	1.000E+00	0.000E+00	3.366E-16	7.642E-15	5.450E-13	3.499E-11	2.435E-10	3.235E-09	1.573E-07	4.379E-06
U-238	∑DSR(j)		2.896E-02	2.899E-02	2.904E-02	2.921E-02	2.961E-02	2.990E-02	3.021E-02	2.751E-02	7.121E-03

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

Dose/Source Ratios for Internal Radiation from Ingestion of Plant Foods (p=3)
Subpathway: Foliar Uptake from Contaminated Dust (q=2)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,3,2,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.726E-06
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.969E-07
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.645E-07
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.503E-07
U-234	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.037E-06
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.525E-06
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.086E-05
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.500E-05
U-235	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.939E-05
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.551E-06
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.058E-08
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.601E-10
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.079E-10
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.464E-10
U-238	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.563E-06

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

Dose/Source Ratios for Internal Radiation from Ingestion of Plant Foods (p=3)
Subpathway: Ditch Irrigation (q=3)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,3,3,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.352E-05
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.721E-11
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.300E-07
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.883E-07
U-234	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.393E-05
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.009E-05
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.201E-06
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.177E-06
U-235	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.147E-05
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.054E-05
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.804E-07
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.772E-13
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.685E-10
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.826E-10
U-238	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.073E-05

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

Dose/Source Ratios for Internal Radiation from Ingestion of Plant Foods (p=3)
Subpathway: Overhead Irrigation (q=4)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,3,4,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.004E-02
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.347E-07
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.152E-05
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.020E-04
U-234	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.015E-02
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.519E-02
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.907E-03
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.490E-03
U-235	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.259E-02
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.583E-02
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.557E-04
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.343E-10
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.379E-08
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.060E-07
U-238	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.608E-02

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

Dose/Source Ratios for Internal Radiation from Ingestion of Plant Foods (p=3)

Total for All Subpathways

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,3,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	3.047E-02	3.049E-02	3.055E-02	3.072E-02	3.114E-02	3.145E-02	3.176E-02	2.889E-02	9.754E-02
U-234	Th-230	1.000E+00	0.000E+00	3.299E-07	7.592E-07	2.290E-06	6.895E-06	1.182E-05	2.535E-05	9.068E-05	2.376E-04
U-234	Ra-226	1.000E+00	0.000E+00	1.003E-08	5.452E-08	5.015E-07	4.430E-06	1.263E-05	5.440E-05	5.969E-04	5.267E-03
U-234	Pb-210	1.000E+00	0.000E+00	2.760E-10	2.939E-09	7.153E-08	1.561E-06	6.458E-06	4.189E-05	6.698E-04	6.916E-03
U-234	∑DSR(j)		3.047E-02	3.049E-02	3.055E-02	3.073E-02	3.116E-02	3.148E-02	3.188E-02	3.025E-02	1.100E-01
U-235	U-235	1.000E+00	2.874E-02	2.877E-02	2.882E-02	2.899E-02	2.939E-02	2.967E-02	2.997E-02	2.728E-02	9.229E-02
U-235	Pa-231	1.000E+00	0.000E+00	1.429E-04	3.379E-04	1.032E-03	3.112E-03	5.323E-03	1.133E-02	3.907E-02	8.967E-02
U-235	Ac-227	1.000E+00	0.000E+00	1.389E-06	6.791E-06	5.550E-05	3.985E-04	9.528E-04	2.839E-03	1.259E-02	3.456E-02
U-235	∑DSR(j)		2.874E-02	2.891E-02	2.916E-02	3.008E-02	3.290E-02	3.595E-02	4.414E-02	7.894E-02	2.165E-01
U-238	U-238	1.000E+00	2.896E-02	2.899E-02	2.904E-02	2.920E-02	2.961E-02	2.989E-02	3.020E-02	2.749E-02	9.298E-02
U-238	U-234	1.000E+00	0.000E+00	1.297E-07	3.031E-07	9.146E-07	2.693E-06	4.502E-06	9.050E-06	2.462E-05	2.771E-04
U-238	Th-230	1.000E+00	0.000E+00	7.479E-13	3.837E-12	3.411E-11	2.948E-10	8.290E-10	3.460E-09	3.379E-08	2.084E-07
U-238	Ra-226	1.000E+00	0.000E+00	1.495E-14	1.809E-13	4.950E-12	1.262E-10	5.917E-10	4.981E-09	1.519E-07	3.470E-06
U-238	Pb-210	1.000E+00	0.000E+00	3.366E-16	7.642E-15	5.450E-13	3.499E-11	2.435E-10	3.235E-09	1.573E-07	4.586E-06
U-238	∑DSR(j)		2.896E-02	2.899E-02	2.904E-02	2.921E-02	2.961E-02	2.990E-02	3.021E-02	2.751E-02	9.327E-02

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

Dose/Source Ratios for Internal Radiation from Ingestion of Meat (p=4)
Subpathway: Fodder Root Uptake from Contaminated Soil (q=1)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,4,1,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	1.370E-04	1.371E-04	1.374E-04	1.381E-04	1.400E-04	1.414E-04	1.428E-04	1.299E-04	3.345E-05
U-234	Th-230	1.000E+00	0.000E+00	5.380E-10	1.106E-09	3.130E-09	9.222E-09	1.574E-08	3.363E-08	1.200E-07	3.137E-07
U-234	Ra-226	1.000E+00	0.000E+00	1.288E-10	7.116E-10	6.604E-09	5.850E-08	1.669E-07	7.190E-07	7.893E-06	6.950E-05
U-234	Pb-210	1.000E+00	0.000E+00	3.435E-12	3.399E-11	7.838E-10	1.675E-08	6.900E-08	4.461E-07	7.119E-06	7.237E-05
U-234	∑DSR(j)		1.370E-04	1.371E-04	1.374E-04	1.382E-04	1.401E-04	1.416E-04	1.440E-04	1.450E-04	1.756E-04
U-235	U-235	1.000E+00	1.292E-04	1.294E-04	1.296E-04	1.303E-04	1.321E-04	1.334E-04	1.348E-04	1.227E-04	3.165E-05
U-235	Pa-231	1.000E+00	0.000E+00	9.260E-06	2.215E-05	6.806E-05	2.056E-04	3.518E-04	7.488E-04	2.583E-03	5.736E-03
U-235	Ac-227	1.000E+00	0.000E+00	2.281E-08	5.550E-08	1.797E-07	6.040E-07	1.105E-06	2.567E-06	9.594E-06	2.186E-05
U-235	∑DSR(j)		1.292E-04	1.386E-04	1.518E-04	1.986E-04	3.383E-04	4.863E-04	8.861E-04	2.716E-03	5.789E-03
U-238	U-238	1.000E+00	1.302E-04	1.303E-04	1.306E-04	1.313E-04	1.331E-04	1.344E-04	1.358E-04	1.236E-04	3.189E-05
U-238	U-234	1.000E+00	0.000E+00	5.831E-10	1.363E-09	4.112E-09	1.211E-08	2.024E-08	4.069E-08	1.107E-07	9.502E-08
U-238	Th-230	1.000E+00	0.000E+00	1.413E-15	6.077E-15	4.815E-14	3.988E-13	1.111E-12	4.606E-12	4.477E-11	2.748E-10
U-238	Ra-226	1.000E+00	0.000E+00	1.893E-16	2.346E-15	6.504E-14	1.665E-12	7.814E-12	6.582E-11	2.009E-09	4.557E-08
U-238	Pb-210	1.000E+00	0.000E+00	4.306E-18	9.032E-17	6.032E-15	3.770E-13	2.608E-12	3.450E-11	1.673E-09	4.651E-08
U-238	∑DSR(j)		1.302E-04	1.303E-04	1.306E-04	1.313E-04	1.331E-04	1.344E-04	1.358E-04	1.237E-04	3.208E-05

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

Dose/Source Ratios for Internal Radiation from Ingestion of Meat (p=4)
Subpathway: Fodder Foliar Uptake from Contaminated Dust (q=2)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,4,2,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.671E-08
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.564E-09
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.662E-09
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.584E-08
U-234	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.128E-07
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.312E-08
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.859E-06
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.273E-08
U-235	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.945E-06
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.359E-08
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.895E-10
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.370E-12
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.680E-12
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.303E-11
U-238	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.381E-08

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

Dose/Source Ratios for Internal Radiation from Ingestion of Meat (p=4)
Subpathway: Ditch Irrigation (q=3)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,4,3,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.866E-07
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.024E-13
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.123E-09
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.996E-09
U-234	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.897E-07
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.765E-07
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.542E-07
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.408E-09
U-235	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.321E-07
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.779E-07
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.299E-10
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.631E-16
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.320E-12
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.034E-12
U-238	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.784E-07

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

Dose/Source Ratios for Internal Radiation from Ingestion of Meat (p=4)
Subpathway: Overhead Irrigation (q=4)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,4,4,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.612E-03
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.064E-09
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.065E-07
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.294E-06
U-234	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.617E-03
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.525E-03
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.649E-04
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.580E-06
U-235	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.297E-03
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.537E-03
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.579E-06
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.607E-12
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.252E-09
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.676E-09
U-238	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.541E-03

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

Dose/Source Ratios for Internal Radiation from Ingestion of Meat (p=4)
Subpathway: Livestock Water (q=5)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,4,5,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.505E-03
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.927E-09
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.663E-07
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.010E-06
U-234	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.510E-03
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.424E-03
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.142E-04
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.144E-06
U-235	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.144E-03
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.435E-03
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.275E-06
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.236E-12
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.169E-09
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.101E-09
U-238	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.439E-03

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

Dose/Source Ratios for Internal Radiation from Ingestion of Meat (p=4)
Total for All Subpathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,4,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	1.370E-04	1.371E-04	1.374E-04	1.381E-04	1.400E-04	1.414E-04	1.428E-04	1.299E-04	3.398E-03
U-234	Th-230	1.000E+00	0.000E+00	5.380E-10	1.106E-09	3.130E-09	9.222E-09	1.574E-08	3.363E-08	1.200E-07	6.106E-06
U-234	Ra-226	1.000E+00	0.000E+00	1.288E-10	7.116E-10	6.604E-09	5.850E-08	1.669E-07	7.190E-07	7.893E-06	1.027E-04
U-234	Pb-210	1.000E+00	0.000E+00	3.435E-12	3.399E-11	7.838E-10	1.675E-08	6.900E-08	4.461E-07	7.119E-06	2.133E-04
U-234	∑DSR(j)		1.370E-04	1.371E-04	1.374E-04	1.382E-04	1.401E-04	1.416E-04	1.440E-04	1.450E-04	3.720E-03
U-235	U-235	1.000E+00	1.292E-04	1.294E-04	1.296E-04	1.303E-04	1.321E-04	1.334E-04	1.348E-04	1.227E-04	3.215E-03
U-235	Pa-231	1.000E+00	0.000E+00	9.260E-06	2.215E-05	6.806E-05	2.056E-04	3.518E-04	7.488E-04	2.583E-03	1.780E-02
U-235	Ac-227	1.000E+00	0.000E+00	2.281E-08	5.550E-08	1.797E-07	6.040E-07	1.105E-06	2.567E-06	9.594E-06	1.187E-04
U-235	∑DSR(j)		1.292E-04	1.386E-04	1.518E-04	1.986E-04	3.383E-04	4.863E-04	8.861E-04	2.716E-03	2.113E-02
U-238	U-238	1.000E+00	1.302E-04	1.303E-04	1.306E-04	1.313E-04	1.331E-04	1.344E-04	1.358E-04	1.236E-04	3.239E-03
U-238	U-234	1.000E+00	0.000E+00	5.831E-10	1.363E-09	4.112E-09	1.211E-08	2.024E-08	4.069E-08	1.107E-07	9.651E-06
U-238	Th-230	1.000E+00	0.000E+00	1.413E-15	6.077E-15	4.815E-14	3.988E-13	1.111E-12	4.606E-12	4.477E-11	5.357E-09
U-238	Ra-226	1.000E+00	0.000E+00	1.893E-16	2.346E-15	6.504E-14	1.665E-12	7.814E-12	6.582E-11	2.009E-09	6.902E-08
U-238	Pb-210	1.000E+00	0.000E+00	4.306E-18	9.032E-17	6.032E-15	3.770E-13	2.608E-12	3.450E-11	1.673E-09	1.486E-07
U-238	∑DSR(j)		1.302E-04	1.303E-04	1.306E-04	1.313E-04	1.331E-04	1.344E-04	1.358E-04	1.237E-04	3.249E-03

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

Dose/Source Ratios for Internal Radiation from Ingestion of Milk (p=5)
Subpathway: Fodder Root Uptake from Contaminated Soil (q=1)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,5,1,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	2.019E-03	2.021E-03	2.025E-03	2.037E-03	2.064E-03	2.084E-03	2.105E-03	1.915E-03	4.931E-04
U-234	Th-230	1.000E+00	0.000E+00	2.727E-10	5.099E-10	1.356E-09	3.901E-09	6.623E-09	1.410E-08	5.018E-08	1.310E-07
U-234	Ra-226	1.000E+00	0.000E+00	1.151E-09	6.125E-09	5.572E-08	4.904E-07	1.397E-06	6.013E-06	6.596E-05	5.806E-04
U-234	Pb-210	1.000E+00	0.000E+00	8.284E-12	9.260E-11	2.326E-09	5.133E-08	2.129E-07	1.384E-06	2.215E-05	2.253E-04
U-234	∑DSR(j)		2.019E-03	2.021E-03	2.025E-03	2.037E-03	2.065E-03	2.086E-03	2.113E-03	2.003E-03	1.299E-03
U-235	U-235	1.000E+00	1.905E-03	1.907E-03	1.910E-03	1.921E-03	1.948E-03	1.967E-03	1.987E-03	1.808E-03	4.665E-04
U-235	Pa-231	1.000E+00	0.000E+00	8.448E-08	1.922E-07	5.758E-07	1.725E-06	2.946E-06	6.263E-06	2.159E-05	4.791E-05
U-235	Ac-227	1.000E+00	0.000E+00	2.729E-09	1.420E-08	1.202E-07	8.732E-07	2.093E-06	6.245E-06	2.772E-05	6.619E-05
U-235	∑DSR(j)		1.905E-03	1.907E-03	1.911E-03	1.922E-03	1.950E-03	1.972E-03	1.999E-03	1.858E-03	5.806E-04
U-238	U-238	1.000E+00	1.920E-03	1.921E-03	1.925E-03	1.936E-03	1.962E-03	1.982E-03	2.002E-03	1.822E-03	4.700E-04
U-238	U-234	1.000E+00	0.000E+00	8.596E-09	2.009E-08	6.062E-08	1.785E-07	2.984E-07	5.999E-07	1.632E-06	1.401E-06
U-238	Th-230	1.000E+00	0.000E+00	7.978E-16	3.019E-15	2.156E-14	1.708E-13	4.713E-13	1.938E-12	1.874E-11	1.148E-10
U-238	Ra-226	1.000E+00	0.000E+00	1.745E-15	2.049E-14	5.515E-13	1.398E-11	6.549E-11	5.507E-10	1.679E-08	3.807E-07
U-238	Pb-210	1.000E+00	0.000E+00	9.894E-18	2.374E-16	1.762E-14	1.149E-12	8.018E-12	1.068E-10	5.200E-09	1.448E-07
U-238	∑DSR(j)		1.920E-03	1.921E-03	1.925E-03	1.936E-03	1.963E-03	1.982E-03	2.002E-03	1.823E-03	4.720E-04

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

Dose/Source Ratios for Internal Radiation from Ingestion of Milk (p=5)
Subpathway: Fodder Foliar Uptake from Contaminated Dust (q=2)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,5,2,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.833E-07
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.531E-10
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.237E-08
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.122E-07
U-234	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.169E-06
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.303E-07
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.389E-08
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.320E-07
U-235	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.086E-06
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.373E-07
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.793E-09
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.722E-13
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.745E-11
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.213E-11
U-238	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.402E-07

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

Dose/Source Ratios for Internal Radiation from Ingestion of Milk (p=5)
Subpathway: Ditch Irrigation (q=3)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,5,3,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.751E-06
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.414E-13
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.386E-09
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.237E-09
U-234	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.766E-06
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.602E-06
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.965E-09
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.573E-09
U-235	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.610E-06
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.622E-06
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.812E-09
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.968E-16
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.938E-11
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.260E-11
U-238	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.630E-06

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

Dose/Source Ratios for Internal Radiation from Ingestion of Milk (p=5)
Subpathway: Overhead Irrigation (q=4)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,5,4,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.376E-02
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.354E-09
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.068E-06
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.346E-05
U-234	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.378E-02
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.248E-02
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.442E-06
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.950E-05
U-235	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.253E-02
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.265E-02
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.750E-05
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.738E-12
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.046E-08
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.720E-08
U-238	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.272E-02

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

Dose/Source Ratios for Internal Radiation from Ingestion of Milk (p=5)

Subpathway: Livestock Water (q=5)

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent	Product	Branch	DSR(j,5,5,t) (mrem/yr)/(pCi/g)								
(i)	(j)	Fraction*	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.141E-02
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.498E-10
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.433E-06
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.463E-06
U-234	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.142E-02
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.079E-02
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.092E-06
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.896E-05
U-235	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.082E-02
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.088E-02
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.240E-05
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.795E-12
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.023E-09
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.306E-08
U-238	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.091E-02

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

Dose/Source Ratios for Internal Radiation from Ingestion of Milk (p=5)

Total for All Subpathways

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent	Product	Branch	DSR(j,5,t) (mrem/yr)/(pCi/g)								
(i)	(j)	Fraction*	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	2.019E-03	2.021E-03	2.025E-03	2.037E-03	2.064E-03	2.084E-03	2.105E-03	1.915E-03	3.723E-02
U-234	Th-230	1.000E+00	0.000E+00	2.727E-10	5.099E-10	1.356E-09	3.901E-09	6.623E-09	1.410E-08	5.018E-08	1.169E-06
U-234	Ra-226	1.000E+00	0.000E+00	1.151E-09	6.125E-09	5.572E-08	4.904E-07	1.397E-06	6.013E-06	6.596E-05	7.030E-04
U-234	Pb-210	1.000E+00	0.000E+00	8.284E-12	9.260E-11	2.326E-09	5.133E-08	2.129E-07	1.384E-06	2.215E-05	4.233E-04
U-234	∑DSR(j)		2.019E-03	2.021E-03	2.025E-03	2.037E-03	2.065E-03	2.086E-03	2.113E-03	2.003E-03	3.836E-02
U-235	U-235	1.000E+00	1.905E-03	1.907E-03	1.910E-03	1.921E-03	1.948E-03	1.967E-03	1.987E-03	1.808E-03	3.522E-02
U-235	Pa-231	1.000E+00	0.000E+00	8.448E-08	1.922E-07	5.758E-07	1.725E-06	2.946E-06	6.263E-06	2.159E-05	9.535E-05
U-235	Ac-227	1.000E+00	0.000E+00	2.729E-09	1.420E-08	1.202E-07	8.732E-07	2.093E-06	6.245E-06	2.772E-05	3.341E-04
U-235	∑DSR(j)		1.905E-03	1.907E-03	1.911E-03	1.922E-03	1.950E-03	1.972E-03	1.999E-03	1.858E-03	3.565E-02
U-238	U-238	1.000E+00	1.920E-03	1.921E-03	1.925E-03	1.936E-03	1.962E-03	1.982E-03	2.002E-03	1.822E-03	3.549E-02
U-238	U-234	1.000E+00	0.000E+00	8.596E-09	2.009E-08	6.062E-08	1.785E-07	2.984E-07	5.999E-07	1.632E-06	1.057E-04
U-238	Th-230	1.000E+00	0.000E+00	7.978E-16	3.019E-15	2.156E-14	1.708E-13	4.713E-13	1.938E-12	1.874E-11	1.028E-09
U-238	Ra-226	1.000E+00	0.000E+00	1.745E-15	2.049E-14	5.515E-13	1.398E-11	6.549E-11	5.507E-10	1.679E-08	4.715E-07
U-238	Pb-210	1.000E+00	0.000E+00	9.894E-18	2.374E-16	1.762E-14	1.149E-12	8.018E-12	1.068E-10	5.200E-09	2.995E-07
U-238	∑DSR(j)		1.920E-03	1.921E-03	1.925E-03	1.936E-03	1.963E-03	1.982E-03	2.002E-03	1.823E-03	3.559E-02

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

Dose/Source Ratios for Internal Radiation from the Ingestion of Fish (p=6)

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,6,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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

Dose/Source Ratios for Internal Radiation from the Ingestion of Drinking Water (p=7)

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,7,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.508E-01
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.212E-07
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.327E-05
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.373E-04
U-234	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.516E-01
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.158E-01
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.100E-02
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.246E-02
U-235	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.692E-01
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.204E-01
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.849E-03
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.699E-09
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.719E-07
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.490E-06
U-238	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.222E-01

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

Plant/Air and Plant/Water Concentration Ratios

Mass loading [ASR(3)]: 1.000E-04 g/m**3
Area Factor for Mass Loading [FA(2)]: 1.461E-01

Nuclide (i)	FAR(i,3,2,1) m**3/g	FAR(i,3,2,2) m**3/g	FWR(i,3,3,1) L/g	FWR(i,3,3,2) L/g	FWR(i,3,4,1) L/g	FWR(i,3,4,2) L/g
Ac-227	5.6048E-02	2.4084E-01	3.8123E-07	1.8757E-07	3.2458E-04	1.3947E-03
Pa-231	5.6048E-02	2.4084E-01	1.5249E-06	7.5029E-07	3.2458E-04	1.3947E-03
Pb-210	5.6048E-02	2.4084E-01	1.5249E-06	7.5027E-07	3.2458E-04	1.3947E-03
Ra-226	5.6048E-02	2.4084E-01	6.0998E-06	3.0011E-06	3.2458E-04	1.3947E-03
Th-230	5.6048E-02	2.4084E-01	1.5250E-07	7.5030E-08	3.2458E-04	1.3947E-03
U-234	5.6048E-02	2.4084E-01	3.8113E-07	1.8755E-07	3.2458E-04	1.3947E-03
U-235	5.6048E-02	2.4084E-01	3.8113E-07	1.8755E-07	3.2458E-04	1.3947E-03
U-238	5.6048E-02	2.4084E-01	3.8113E-07	1.8755E-07	3.2458E-04	1.3947E-03

FAR(i,p,q,k) is the plant/air concentration ratio for airborne contaminated dust, and FWR(i,p,q,k) is the plant/water concentration ratio. See groundwater displays for water/soil concentration ratios.

Plant/Soil Concentration Ratios, FSR(i,3,q,k,t)

Root Uptake (q=1) and Foliar Dust Deposition (q=2)
Nonleafy (k=1) and/or Leafy (k=2) Vegetables

Nuclide(i) Parent	Product	FSR(i,3,1,k)	FSR(i,3,2,1)	FSR(i,3,2,2)
U-234	U-234	2.5000E-03	8.1890E-07	3.5188E-06
U-234	Th-230	1.0000E-03	8.1890E-07	3.5188E-06
U-234	Ra-226	4.0000E-02	8.1890E-07	3.5188E-06
U-234	Pb-210	1.0000E-02	8.1890E-07	3.5188E-06
U-235	U-235	2.5000E-03	8.1890E-07	3.5188E-06
U-235	Pa-231	1.0000E-02	8.1890E-07	3.5188E-06
U-235	Ac-227	2.5000E-03	8.1890E-07	3.5188E-06
U-238	U-238	2.5000E-03	8.1890E-07	3.5188E-06
U-238	U-234	2.5000E-03	8.1890E-07	3.5188E-06
U-238	Th-230	1.0000E-03	8.1890E-07	3.5188E-06
U-238	Ra-226	4.0000E-02	8.1890E-07	3.5188E-06
U-238	Pb-210	1.0000E-02	8.1890E-07	3.5188E-06

Plant/Soil Concentration Ratio, FSR(j,3,q,k,t)

Ditch Irrigation (q=3)

Parent (i)	Product (j)	Branch Fraction*	FSR(j,3,3,k,t) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.831E-06
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.188E-13
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.961E-10
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.223E-10
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.836E-06
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.304E-09
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.744E-09
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.836E-06
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.197E-09
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.861E-16
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.643E-12
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.508E-13

Plant/Soil Concentration Ratio, FSR(j,3,q,k,t)

Overhead Irrigation (q=4) and Nonleafy Vegetables (k=1)

Parent (i)	Product (j)	Branch Fraction*	FSR(j,3,4,1,t) * SF(j,t) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.559E-03
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.913E-10
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.236E-08
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.861E-08
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.564E-03
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.342E-06
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.485E-06
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.564E-03
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.426E-06
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.099E-12
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.742E-11
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.385E-10

Plant/Soil Concentration Ratio, FSR(j,3,q,k,t)

Overhead Irrigation (q=4) and Leafy Vegetables (k=2)

Parent (i)	Product (j)	Branch Fraction*	FSR(j,3,4,2,t) * SF(j,t) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.700E-03
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.830E-09
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.821E-07
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.949E-07
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.719E-03
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.766E-06
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.382E-06
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.719E-03
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.902E-05
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.019E-12
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.758E-10
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.956E-10

Meat/Fodder, Milk/Fodder, Fodder/Air and Fodder/Water Concentration Ratios

FI(4,q): 27.1 kg/day FI(5,q): 63.3 kg/day q=1,2,3,4
FI(4,q): 50.0 L/day FI(5,q): 60.0 L/day q=5
FI(4,q): 0.5 kg/day FI(5,q):

Nuclide (i)	FQR(i,4) d/kg	FQR(i,5) d/kg	FAR(i,3,2,3) m**3/g	FWR(i,3,3,3) L/g	FWR(i,3,4,3) L/g
Ac-227	2.0000E-05	2.0000E-05	3.4121E-01	2.2874E-07	1.9760E-03
Pa-231	5.0000E-03	5.0000E-06	3.4121E-01	9.1498E-07	1.9760E-03
Pb-210	8.0000E-04	3.0000E-04	3.4121E-01	9.1496E-07	1.9760E-03
Ra-226	1.0000E-03	1.0000E-03	3.4121E-01	3.6599E-06	1.9760E-03
Th-230	1.0000E-04	5.0000E-06	3.4121E-01	9.1500E-08	1.9760E-03
U-234	3.4000E-04	6.0000E-04	3.4121E-01	2.2871E-07	1.9760E-03
U-235	3.4000E-04	6.0000E-04	3.4121E-01	2.2871E-07	1.9760E-03
U-238	3.4000E-04	6.0000E-04	3.4121E-01	2.2871E-07	1.9760E-03

FI(p,q) are the fodder (q=1,2,3,4), livestock water (q=5) and soil (q=6) intake rates; FQR(i,p) are the transfer coefficients from contaminated fodder of livestock water to meat (p=4) or milk (p=5). FAR(i,3,2,3) are the fodder/air concentration ratios, and FWR(i,3,3,3) and FWR(i,3,4,3) are the fodder/water concentration ratios for ditch and overhead irrigation, respectively.

Fodder/Soil Concentration Ratios, QSR(i,p,q,t), for Meat and Milk Pathways
Root Uptake (q=1) and Foliar Dust Deposition (q=2)

Nuclide(i) Parent	Product	QSR(i,p,1)	QSR(i,p,2)
U-234	U-234	2.5000E-03	4.9853E-06
U-234	Th-230	1.0000E-03	4.9853E-06
U-234	Ra-226	4.0000E-02	4.9853E-06
U-234	Pb-210	1.0000E-02	4.9853E-06
U-235	U-235	2.5000E-03	4.9853E-06
U-235	Pa-231	1.0000E-02	4.9853E-06
U-235	Ac-227	2.5000E-03	4.9853E-06
U-238	U-238	2.5000E-03	4.9853E-06
U-238	U-234	2.5000E-03	4.9853E-06
U-238	Th-230	1.0000E-03	4.9853E-06
U-238	Ra-226	4.0000E-02	4.9853E-06
U-238	Pb-210	1.0000E-02	4.9853E-06

Fodder/Soil Concentration Ratio, QSR(j,p,q,t),for Meat and Milk Pathways
Ditch Irrigation (q=3)

Parent	Product	Branch	QSR(j,p,3,t) * SF(j,t)								
(i)	(j)	Fraction* t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Fodder/Soil Concentration Ratio, QSR(j,p,q,t),for Meat and Milk Pathways

Overhead Irrigation (q=4)

Parent	Product	Branch	QSR(j,p,4,t) * SF(j,t)								
(i)	(j)	Fraction*	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Fodder/Soil Concentration Ratio, QSR(j,p,q,t),for Meat and Milk Pathways

Livestock Water (q=5)

Parent	Product	Branch	QSR(j,p,5,t) * SF(j,t)								
(i)	(j)	Fraction*	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Meat/Soil Concentration Ratios, FSR(i,4,q,t)
Root Uptake (q=1) and Foliar Dust Deposition (q=2)

Nuclide(i)			
Parent	Product	FSR(i,4,1)	FSR(i,4,2)
U-234	U-234	7.4326E-06	0.0000E+00
U-234	Th-230	0.0000E+00	0.0000E+00
U-234	Ra-226	0.0000E+00	0.0000E+00
U-234	Pb-210	0.0000E+00	0.0000E+00
U-235	U-235	7.4326E-06	0.0000E+00
U-235	Pa-231	0.0000E+00	0.0000E+00
U-235	Ac-227	0.0000E+00	0.0000E+00
U-238	U-238	7.4326E-06	0.0000E+00
U-238	U-234	0.0000E+00	0.0000E+00
U-238	Th-230	0.0000E+00	0.0000E+00
U-238	Ra-226	0.0000E+00	0.0000E+00
U-238	Pb-210	0.0000E+00	0.0000E+00

Meat/Soil Concentration Ratio, FSR(j,4,q,t)
Ditch Irrigation (q=3)

Parent	Product	Branch	FSR(j,4,3,t) * SF(j,t)								
(i)	(j)	Fraction*	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.012E-08
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.809E-16
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.294E-11
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.192E-12
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.015E-08
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.125E-10
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.672E-13
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.015E-08
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.874E-11
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.603E-18
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.671E-14
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.464E-15

Meat/Soil Concentration Ratio, FSR(j,4,q,t)

Overhead Irrigation (q=4)

Parent	Product	Branch	FSR(j,4,4,t) * SF(j,t)								
(i)	(j)	Fraction*	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.746E-05
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.470E-11
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.988E-09
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.054E-09
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.771E-05
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.107E-06
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.900E-09
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.771E-05
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.483E-07
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.462E-14
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.442E-11
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.828E-11

Meat/Soil Concentration Ratio, FSR(j,4,q,t)

Livestock Water (q=5)

Parent	Product	Branch	FSR(j,4,5,t) * SF(j,t)								
(i)	(j)	Fraction*	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.166E-05
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.373E-11
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.525E-09
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.454E-09
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.189E-05
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.033E-06
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.575E-09
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.189E-05
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.318E-07
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.233E-14
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.347E-11
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.707E-11

Milk/Soil Concentration Ratios, FSR(i,5,q,t)
Root Uptake (q=1) and Foliar Dust Deposition (q=2)

Nuclide(i)			
Parent	Product	FSR(i,5,1)	FSR(i,5,2)
U-234	U-234	3.0613E-05	0.0000E+00
U-234	Th-230	0.0000E+00	0.0000E+00
U-234	Ra-226	0.0000E+00	0.0000E+00
U-234	Pb-210	0.0000E+00	0.0000E+00
U-235	U-235	3.0613E-05	0.0000E+00
U-235	Pa-231	0.0000E+00	0.0000E+00
U-235	Ac-227	0.0000E+00	0.0000E+00
U-238	U-238	3.0613E-05	0.0000E+00
U-238	U-234	0.0000E+00	0.0000E+00
U-238	Th-230	0.0000E+00	0.0000E+00
U-238	Ra-226	0.0000E+00	0.0000E+00
U-238	Pb-210	0.0000E+00	0.0000E+00

Milk/Soil Concentration Ratio, FSR(j,5,q,t)
Ditch Irrigation (q=3)

Parent	Product	Branch	FSR(j,5,3,t) * SF(j,t)								
(i)	(j)	Fraction* t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.170E-08
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.947E-17
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.022E-11
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.670E-12
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.181E-08
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.196E-12
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.324E-12
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.181E-08
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.184E-10
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.871E-19
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.237E-14
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.414E-15

Milk/Soil Concentration Ratio, FSR(j,5,q,t)

Overhead Irrigation (q=4)

Parent	Product	Branch	FSR(j,5,4,t) * SF(j,t)								
(i)	(j)	Fraction*	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.602E-04
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.716E-12
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.631E-08
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.927E-09
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.613E-04
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.583E-09
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.144E-08
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.613E-04
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.023E-06
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.041E-15
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.367E-11
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.601E-11

Milk/Soil Concentration Ratio, FSR(j,5,q,t)

Livestock Water (q=5)

Parent	Product	Branch	FSR(j,5,5,t) * SF(j,t)								
(i)	(j)	Fraction*	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.729E-04
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.239E-13
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.832E-09
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.805E-09
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.734E-04
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.240E-09
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.491E-09
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.734E-04
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.910E-07
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.940E-15
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.617E-11
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.686E-12

Dose/Source Ratios for Soil Ingestion Pathway (p=8)

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,8,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.125E-04
U-234	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.491E-05
U-234	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.380E-05
U-234	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.132E-05
U-234	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.225E-04
U-235	U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.957E-04
U-235	Pa-231	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.109E-04
U-235	Ac-227	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.258E-03
U-235	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.465E-03
U-238	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.979E-04
U-238	U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.876E-07
U-238	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.182E-08
U-238	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.048E-09
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.583E-08
U-238	∑DSR(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.988E-04

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

Dose Conversion and Environmental Transport Factors for the Soil Ingestion Pathway (p=8)

Parent (i)	Product (j)	DCF(j,8)*	ETF(j,8,t) (g/yr) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.401E+01
U-234	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.401E+01
U-234	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.401E+01
U-234	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.401E+01
U-235	U-235	2.670E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.401E+01
U-235	Pa-231	1.060E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.401E+01
U-235	Ac-227	1.480E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.401E+01
U-238	U-238	2.690E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.401E+01
U-238	U-234	2.830E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.401E+01
U-238	Th-230	5.480E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.401E+01
U-238	Ra-226	1.330E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.401E+01
U-238	Pb-210	7.270E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.401E+01

* - The dose conversion factor units are mrem/pCi.

RESRAD Report, Part IV: Concentration of Radionuclides – On-Site Resident Farmer Scenario groundwater concentrations used to determine U-238 cleanup criteria using DOMENICO

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Part IV: Concentration of Radionuclides

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Concentration of radionuclides in environmental media
at t = 0.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ac-227	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ra-226	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-230	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 0.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ac-227	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ra-226	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-230	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	0.000E+00	8.067E-01	8.067E-01	8.067E-01	8.067E-01	7.433E-03	3.061E-02	0.000E+00	0.000E+00
U-235	0.000E+00	8.067E-01	8.067E-01	8.067E-01	8.067E-01	7.433E-03	3.061E-02	0.000E+00	0.000E+00
U-238	0.000E+00	8.067E-01	8.067E-01	8.067E-01	8.067E-01	7.433E-03	3.061E-02	0.000E+00	0.000E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ac-227	3.329E-07	0.000E+00	0.000E+00	1.765E-10	5.860E-13
Pa-231	2.113E-05	0.000E+00	0.000E+00	1.355E-08	4.497E-11
Pb-210	2.003E-11	0.000E+00	0.000E+00	1.254E-14	4.164E-17
Ra-226	1.948E-09	0.000E+00	0.000E+00	7.402E-13	2.458E-15
Th-230	8.990E-06	0.000E+00	0.000E+00	8.609E-12	2.858E-14
U-234	9.975E-01	0.000E+00	0.000E+00	1.061E-02	3.523E-05
U-235	9.975E-01	0.000E+00	0.000E+00	1.061E-02	3.523E-05
U-238	9.975E-01	0.000E+00	0.000E+00	1.061E-02	3.523E-05

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ac-227	1.760E-10	3.296E-07	2.742E-07	2.412E-07	2.683E-07	1.541E-08	3.416E-10	8.523E-12	5.510E-10
Pa-231	1.407E-08	6.644E-05	6.829E-05	6.468E-05	6.825E-05	8.776E-06	2.343E-08	5.698E-10	5.570E-09
Pb-210	1.250E-14	8.542E-11	6.647E-11	5.480E-11	6.434E-11	2.225E-12	1.356E-12	1.160E-14	4.186E-15
Ra-226	7.334E-13	2.338E-08	2.509E-08	2.254E-08	2.509E-08	6.110E-10	1.587E-09	1.151E-13	5.760E-13
Th-230	2.693E-10	3.079E-06	2.924E-06	2.752E-06	2.903E-06	1.130E-08	1.702E-09	6.218E-11	3.703E-10
U-234	1.058E-02	8.107E-01	8.221E-01	8.269E-01	8.282E-01	7.788E-03	3.181E-02	3.446E-04	2.067E-03
U-235	1.058E-02	8.107E-01	8.221E-01	8.269E-01	8.282E-01	7.788E-03	3.181E-02	3.446E-04	2.067E-03
U-238	1.058E-02	8.107E-01	8.221E-01	8.269E-01	8.282E-01	7.788E-03	3.181E-02	3.446E-04	2.067E-03

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ac-227	2.927E-06	0.000E+00	0.000E+00	4.684E-09	1.555E-11
Pa-231	6.320E-05	0.000E+00	0.000E+00	1.217E-07	4.042E-10
Pb-210	5.314E-10	0.000E+00	0.000E+00	9.498E-13	3.153E-15
Ra-226	1.749E-08	0.000E+00	0.000E+00	1.995E-11	6.622E-14
Th-230	2.690E-05	0.000E+00	0.000E+00	7.736E-11	2.568E-13
U-234	9.924E-01	0.000E+00	0.000E+00	3.177E-02	1.055E-04
U-235	9.924E-01	0.000E+00	0.000E+00	3.177E-02	1.055E-04
U-238	9.924E-01	0.000E+00	0.000E+00	3.177E-02	1.055E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+00 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ac-227	4.680E-09	2.573E-06	2.406E-06	2.309E-06	2.391E-06	4.910E-08	3.035E-09	2.306E-10	1.523E-08
Pa-231	1.233E-07	2.041E-04	2.061E-04	2.025E-04	2.061E-04	2.748E-05	6.720E-08	4.407E-09	4.635E-08
Pb-210	9.479E-13	1.930E-09	1.748E-09	1.642E-09	1.730E-09	4.570E-11	3.406E-11	9.218E-13	3.163E-13
Ra-226	1.988E-11	2.224E-07	2.277E-07	2.198E-07	2.277E-07	5.959E-09	1.440E-08	3.239E-12	1.620E-11
Th-230	8.593E-10	8.940E-06	8.784E-06	8.611E-06	8.764E-06	2.755E-08	3.615E-09	2.059E-10	1.210E-09
U-234	3.174E-02	8.190E-01	8.530E-01	8.702E-01	8.715E-01	8.546E-03	3.421E-02	1.047E-03	6.282E-03
U-235	3.174E-02	8.190E-01	8.530E-01	8.702E-01	8.715E-01	8.546E-03	3.421E-02	1.047E-03	6.282E-03
U-238	3.174E-02	8.190E-01	8.530E-01	8.702E-01	8.715E-01	8.546E-03	3.421E-02	1.047E-03	6.282E-03

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ac-227	3.004E-05	0.000E+00	0.000E+00	1.636E-07	5.430E-10
Pa-231	2.086E-04	0.000E+00	0.000E+00	1.346E-06	4.467E-09
Pb-210	1.854E-08	0.000E+00	0.000E+00	1.111E-10	3.687E-13
Ra-226	1.929E-07	0.000E+00	0.000E+00	7.353E-10	2.441E-12
Th-230	8.888E-05	0.000E+00	0.000E+00	8.552E-10	2.839E-12
U-234	9.750E-01	0.000E+00	0.000E+00	1.051E-01	3.489E-04
U-235	9.750E-01	0.000E+00	0.000E+00	1.051E-01	3.489E-04
U-238	9.750E-01	0.000E+00	0.000E+00	1.051E-01	3.489E-04

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ac-227	1.635E-07	2.575E-05	2.534E-05	2.512E-05	2.538E-05	1.783E-07	3.231E-08	8.115E-09	5.395E-07
Pa-231	1.351E-06	6.946E-04	6.979E-04	6.949E-04	6.987E-04	9.451E-05	2.238E-07	4.589E-08	4.977E-07
Pb-210	1.110E-10	6.420E-08	6.221E-08	6.112E-08	6.206E-08	1.445E-09	1.193E-09	1.096E-10	3.687E-11
Ra-226	7.346E-10	2.556E-06	2.575E-06	2.548E-06	2.575E-06	6.908E-08	1.629E-07	1.212E-10	6.062E-10
Th-230	3.444E-09	2.984E-05	2.969E-05	2.951E-05	2.967E-05	8.549E-08	1.043E-08	8.832E-10	5.017E-09
U-234	1.051E-01	8.475E-01	9.600E-01	1.020E+00	1.021E+00	1.117E-02	4.253E-02	3.481E-03	2.089E-02
U-235	1.051E-01	8.475E-01	9.600E-01	1.020E+00	1.021E+00	1.117E-02	4.253E-02	3.481E-03	2.089E-02
U-238	1.051E-01	8.475E-01	9.600E-01	1.020E+00	1.021E+00	1.117E-02	4.253E-02	3.481E-03	2.089E-02

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ac-227	2.183E-04	0.000E+00	0.000E+00	3.764E-06	1.249E-08
Pa-231	6.081E-04	0.000E+00	0.000E+00	1.193E-05	3.962E-08
Pb-210	4.260E-07	0.000E+00	0.000E+00	7.835E-09	2.601E-11
Ra-226	1.698E-06	0.000E+00	0.000E+00	1.959E-08	6.504E-11
Th-230	2.600E-04	0.000E+00	0.000E+00	7.585E-09	2.518E-11
U-234	9.267E-01	0.000E+00	0.000E+00	3.084E-01	1.024E-03
U-235	9.267E-01	0.000E+00	0.000E+00	3.084E-01	1.024E-03
U-238	9.267E-01	0.000E+00	0.000E+00	3.084E-01	1.024E-03

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ac-227	3.763E-06	1.975E-04	1.997E-04	2.011E-04	2.017E-04	6.332E-07	2.597E-07	1.872E-07	1.246E-05
Pa-231	1.195E-05	2.167E-03	2.182E-03	2.184E-03	2.188E-03	2.990E-04	6.995E-07	3.998E-07	4.377E-06
Pb-210	7.833E-09	1.541E-06	1.529E-06	1.524E-06	1.532E-06	3.441E-08	2.933E-08	7.779E-09	2.602E-09
Ra-226	1.959E-08	2.413E-05	2.421E-05	2.413E-05	2.422E-05	6.549E-07	1.533E-06	3.245E-09	1.623E-08
Th-230	1.518E-08	9.276E-05	9.260E-05	9.241E-05	9.258E-05	2.596E-07	3.090E-08	4.280E-09	2.316E-08
U-234	3.084E-01	9.248E-01	1.255E+00	1.433E+00	1.434E+00	1.844E-02	6.553E-02	1.023E-02	6.139E-02
U-235	3.084E-01	9.248E-01	1.255E+00	1.433E+00	1.434E+00	1.844E-02	6.553E-02	1.023E-02	6.139E-02
U-238	3.084E-01	9.248E-01	1.255E+00	1.433E+00	1.434E+00	1.844E-02	6.553E-02	1.023E-02	6.139E-02

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 5.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ac-227	4.989E-04	0.000E+00	0.000E+00	1.507E-05	5.002E-08
Pa-231	9.853E-04	0.000E+00	0.000E+00	3.267E-05	1.085E-07
Pb-210	1.699E-06	0.000E+00	0.000E+00	5.323E-08	1.767E-10
Ra-226	4.616E-06	0.000E+00	0.000E+00	8.953E-08	2.972E-10
Th-230	4.226E-04	0.000E+00	0.000E+00	2.076E-08	6.894E-11
U-234	8.809E-01	0.000E+00	0.000E+00	5.030E-01	1.670E-03
U-235	8.809E-01	0.000E+00	0.000E+00	5.030E-01	1.670E-03
U-238	8.809E-01	0.000E+00	0.000E+00	5.030E-01	1.670E-03

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 5.000E+01 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ac-227	1.507E-05	4.800E-04	4.930E-04	5.005E-04	5.015E-04	1.194E-06	6.525E-07	7.496E-07	4.994E-05
Pa-231	3.269E-05	3.735E-03	3.772E-03	3.787E-03	3.791E-03	5.213E-04	1.214E-06	1.090E-06	1.196E-05
Pb-210	5.322E-08	6.503E-06	6.503E-06	6.509E-06	6.528E-06	1.462E-07	1.252E-07	5.291E-08	1.768E-08
Ra-226	8.951E-08	6.975E-05	6.995E-05	6.985E-05	7.000E-05	1.897E-06	4.433E-06	1.484E-08	7.421E-08
Th-230	3.316E-08	1.601E-04	1.599E-04	1.597E-04	1.599E-04	4.455E-07	5.273E-08	9.768E-09	5.172E-08
U-234	5.030E-01	9.962E-01	1.534E+00	1.826E+00	1.827E+00	2.536E-02	8.744E-02	1.669E-02	1.002E-01
U-235	5.030E-01	9.962E-01	1.534E+00	1.826E+00	1.827E+00	2.536E-02	8.744E-02	1.669E-02	1.002E-01
U-238	5.030E-01	9.962E-01	1.534E+00	1.826E+00	1.827E+00	2.536E-02	8.744E-02	1.669E-02	1.002E-01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ac-227	1.310E-03	0.000E+00	0.000E+00	8.765E-05	2.910E-07
Pa-231	1.837E-03	0.000E+00	0.000E+00	1.260E-04	4.185E-07
Pb-210	9.775E-06	0.000E+00	0.000E+00	6.432E-07	2.135E-09
Ra-226	1.750E-05	0.000E+00	0.000E+00	6.934E-07	2.302E-09
Th-230	7.947E-04	0.000E+00	0.000E+00	8.013E-08	2.660E-10
U-234	7.760E-01	0.000E+00	0.000E+00	9.536E-01	3.166E-03
U-235	7.760E-01	0.000E+00	0.000E+00	9.536E-01	3.166E-03
U-238	7.760E-01	0.000E+00	0.000E+00	9.536E-01	3.166E-03

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ac-227	8.765E-05	1.457E-03	1.544E-03	1.593E-03	1.594E-03	2.942E-06	2.122E-06	4.363E-06	2.907E-04
Pa-231	1.261E-04	8.007E-03	8.144E-03	8.213E-03	8.218E-03	1.144E-03	2.645E-06	4.196E-06	4.609E-05
Pb-210	6.431E-07	4.288E-05	4.332E-05	4.361E-05	4.367E-05	9.836E-07	8.418E-07	6.398E-07	2.136E-07
Ra-226	6.933E-07	3.035E-04	3.045E-04	3.046E-04	3.049E-04	8.289E-06	1.933E-05	1.150E-07	5.751E-07
Th-230	1.036E-07	3.450E-04	3.449E-04	3.447E-04	3.449E-04	9.551E-07	1.125E-07	3.205E-08	1.657E-07
U-234	9.535E-01	1.151E+00	2.172E+00	2.725E+00	2.726E+00	4.131E-02	1.378E-01	3.165E-02	1.899E-01
U-235	9.535E-01	1.151E+00	2.172E+00	2.725E+00	2.726E+00	4.131E-02	1.378E-01	3.165E-02	1.899E-01
U-238	9.535E-01	1.151E+00	2.172E+00	2.725E+00	2.726E+00	4.131E-02	1.378E-01	3.165E-02	1.899E-01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 3.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ac-227	3.866E-03	0.000E+00	0.000E+00	9.952E-04	3.304E-06
Pa-231	4.205E-03	0.000E+00	0.000E+00	9.883E-04	3.281E-06
Pb-210	1.045E-04	0.000E+00	0.000E+00	2.366E-05	7.854E-08
Ra-226	1.278E-04	0.000E+00	0.000E+00	1.651E-05	5.481E-08
Th-230	1.888E-03	0.000E+00	0.000E+00	6.289E-07	2.088E-09
U-234	4.672E-01	0.000E+00	0.000E+00	2.332E+00	7.743E-03
U-235	4.672E-01	0.000E+00	0.000E+00	2.332E+00	7.743E-03
U-238	4.672E-01	0.000E+00	0.000E+00	2.332E+00	7.743E-03

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+02 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ac-227	9.951E-04	6.689E-03	7.731E-03	8.305E-03	8.307E-03	1.289E-05	1.170E-05	4.954E-05	3.302E-03
Pa-231	9.884E-04	2.790E-02	2.896E-02	2.953E-02	2.954E-02	4.249E-03	9.655E-06	3.284E-05	3.610E-04
Pb-210	2.365E-05	6.962E-04	7.188E-04	7.320E-04	7.323E-04	1.694E-05	1.434E-05	2.354E-05	7.855E-06
Ra-226	1.651E-05	3.358E-03	3.377E-03	3.385E-03	3.386E-03	9.256E-05	2.152E-04	2.740E-06	1.370E-05
Th-230	6.863E-07	1.239E-03	1.239E-03	1.239E-03	1.240E-03	3.406E-06	3.994E-07	2.221E-07	1.124E-06
U-234	2.332E+00	1.524E+00	4.020E+00	5.375E+00	5.375E+00	8.917E-02	2.880E-01	7.743E-02	4.646E-01
U-235	2.332E+00	1.524E+00	4.020E+00	5.375E+00	5.375E+00	8.917E-02	2.880E-01	7.743E-02	4.646E-01
U-238	2.332E+00	1.524E+00	4.020E+00	5.375E+00	5.375E+00	8.917E-02	2.880E-01	7.743E-02	4.646E-01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time. For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in environmental media
at t = 1.000E+03 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/l	Surface Water pCi/l
Ac-227	6.069E-03	6.069E-03	2.784E-09	8.429E-03	2.798E-05
Pa-231	6.134E-03	6.134E-03	2.814E-09	7.270E-03	2.414E-05
Pb-210	7.003E-04	7.003E-04	3.213E-10	7.103E-04	2.358E-06
Ra-226	7.406E-04	7.406E-04	3.398E-10	4.117E-04	1.367E-06
Th-230	3.247E-03	3.247E-03	1.489E-09	4.643E-06	1.542E-08
U-234	7.914E-02	7.914E-02	3.631E-08	4.261E+00	1.415E-02
U-235	7.914E-02	7.914E-02	3.631E-08	4.261E+00	1.415E-02
U-238	7.914E-02	7.914E-02	3.631E-08	4.261E+00	1.415E-02

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+03 years*

Radio-Nuclide	Drinking Water pCi/l	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/l	Fish pCi/kg	Crustacea pCi/kg
Ac-227	8.429E-03	1.797E-02	2.696E-02	3.186E-02	3.186E-02	1.340E-04	1.111E-04	4.196E-04	2.797E-02
Pa-231	7.270E-03	6.372E-02	7.151E-02	7.575E-02	7.575E-02	2.742E-02	4.150E-05	2.414E-04	2.655E-03
Pb-210	7.102E-04	7.261E-03	7.998E-03	8.410E-03	8.410E-03	4.920E-04	2.776E-04	7.070E-04	2.359E-04
Ra-226	4.117E-04	2.976E-02	3.020E-02	3.044E-02	3.044E-02	1.216E-03	2.321E-03	6.833E-05	3.417E-04
Th-230	4.748E-06	3.251E-03	3.265E-03	3.272E-03	3.272E-03	1.713E-04	9.165E-06	1.566E-06	7.854E-06
U-234	4.261E+00	1.583E+00	6.142E+00	8.620E+00	8.620E+00	1.653E-01	5.043E-01	1.415E-01	8.488E-01
U-235	4.261E+00	1.583E+00	6.142E+00	8.620E+00	8.620E+00	1.653E-01	5.043E-01	1.415E-01	8.488E-01
U-238	4.261E+00	1.583E+00	6.142E+00	8.620E+00	8.620E+00	1.653E-01	5.043E-01	1.415E-01	8.488E-01

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

APPENDIX I:

Ecological Risk Evaluation

APPENDIX I

POTENTIAL ECOLOGICAL IMPACTS OF ALTERNATIVE 2B: REMOVAL AND OFFSITE DISPOSAL OF CONTAMINATED SOILS

The removal and offsite disposal of radiologically and chemically contaminated soils has been selected as the preferred remedial action alternative at the Colonie Site, Albany, New York. As the preferred cleanup option, the effectiveness of this alternative in protecting the environment, as well as the impact of this removal action to the surrounding environment, is evaluated.

Potential Impacts to the Terrestrial Environment

The Colonie site comprises approximately 11 acres of low value habitat in an urban area of mixed residential, commercial and light industrial use. Approximately 6 acres are covered by impervious surfaces such as asphalt parking lots and buildings. The remaining 5 acres consist of mowed grass areas interspersed with a few shrubs and trees. Vegetation on the adjacent industrial and railway properties includes a variety of grasses and weeds. Some of the more common species include aster, fescue, plantain, panic grass, dandelion, smartweed, yarrow, thistle and wild carrot. In addition, scattered shrubs and trees are also found in the adjacent areas (ANL 1984).

The use of the Colonie site by terrestrial fauna is limited because of lack of suitable habitat. For the most part, species using the site reflect those animals commonly found in urban/suburban settings. Some of the more common birds that occur on site include American robin, house sparrow, common crow, rock dove, starlings and common grackle. Small mammals seen on the site or expected to occur on site include Norway rat *Rattus norvegicus*, domestic house mouse *Mus musculus*, eastern cottontail *Sylvilagus floridanus*, and the gray squirrel *Sciurus carolinensis* (ANL, 1984).

The results of the Phase I and II soil investigations of the Colonie site indicated that metals, and primarily lead, were the primary non-radiological chemicals of concern at the site. Although VOCs, PAHs, and phthalates were detected in soils, low frequencies of detection as well as low concentrations, indicate contamination of soil by these compounds to be minor. The ecological risk posed by these chemicals is not expected to be significant.

The proposed remedial action for chemically contaminated soils on site includes the excavation of contaminated soils to a minimum depth of 2 feet (with a potential maximum of 9 feet) with the backfilling of the excavated areas with clean fill to grade. Note that the plan currently calls for the complete excavation of Patroon Lake. In as much as the chemical contamination, principally metals, poses little ecological risk to begin with, the additional removal of residual contamination and the subsequent replacement of as much as 2 to 9 feet of clean soil is expected to preclude exposure of soil invertebrates, wildlife and most vegetation to residual contamination. Note that a 2-foot barrier does not necessarily protect all plants, some of whose roots may extend to a depth greater than 2 feet. Nevertheless, this is generally limited to larger plants, such as trees, which may not be conducive to the future land use of the property.

Moreover, it is unlikely that the concentrations of residual metals remaining below the 2-foot barrier would be sufficiently high to pose a risk of phytotoxicity. Consequently, this remedial alternative is expected to be effective in eliminating exposure and consequent risk to terrestrial flora and fauna inhabiting this area in the future.

During removal activities, vegetation may be displaced during soil removal activities. Little vegetation currently exists on the area proposed for remediation. Vegetation on site and adjacent industrial and railway properties is of low habitat quality and includes a variety of grasses and weeds. Some of the more common species include aster, fescue, plantain, panic grass, dandelion, smartweed, yarrow, thistle and wild carrot. In addition, scattered shrubs and trees are also found in the adjacent areas (ANL, 1984). Except for the areas requiring soil excavation, no impact to surrounding vegetation is expected. Following the soil removal, the excavated area will be backfilled with clean soil, restored as nearly as possible to its original topography, graded to allow proper drainage and revegetated to provide an erosion control cover.

Current ecological use of this area is limited due to poor habitat conditions. For the most part, species using the proposed areas for soil removal reflect those animals commonly found in urban/suburban settings. Some of the more common birds that occur on site include American robin, house sparrow, common crow, rock dove, starlings and common grackle. Small mammals seen on the site or expected to occur on site include Norway rat *Rattus norvegicus*, domestic house mouse *Mus musculus*, eastern cottontail *Sylvilagus floridanus*, and the gray squirrel *Sciurus carolinensis* (ANL, 1984). No sensitive habitat or threatened or endangered species occur in the area proposed for soil removal. Following the backfilling, regrading and the revegetation of these areas following removal, the anticipated wildlife use is expected to be similar to that present prior to site remediation. Short-term loss of habitat during the remediation process and prior to revegetation is not expected to have a significant effect on local terrestrial populations. No long-term adverse ecological impacts are expected to occur as a result of the soil removal.

Based on the poor-quality habitat of the Site, low level metal contamination, and the plan to excavate contaminated soil and replace it with clean soil, the ecological risk is expected to be negligible. Therefore, the development of cleanup goals to protect ecological resources is not warranted.

Potential Impacts to the Aquatic Environment

Surface water on site is limited to an unnamed tributary of Patroon Creek, an urbanized stream that discharges to the Hudson River several miles downstream of the site. This unnamed tributary is a perennial stream that was impounded in the early 1900's to form a reservoir - Patroon Lake. Starting between 1940 and 1952 and continuing through the early 1970's, the lake received fill (casting sand) from NL Industries and, reportedly, municipal waste from the Town of Colonie (BNI 1992 as cited in IT Group 1999). A remaining depression in the landscape that is a remnant of Patroon Lake will be completely backfilled and graded as part of the remedial activities on site.

As part of the remedial investigation of the site, metals have been identified as the primary chemicals of concern at the CISS (IT Group, 1999). Sediment samples collected from the

unnamed tributary in 1993 were compared with background levels and 1991 NYSDEC draft sediment guidelines. With the exception of copper, metals detected in sediments were below background and NYSDEC sediment guidelines (NYSDEC, 1991). Biological investigations of the unnamed tributary indicate that the stream, a portion of which is a concrete-lined storm drain, exhibits an extremely low biotic diversity. The stream is dominated by algal and invertebrate species typical of small, generally degraded streams in urban areas.

The removal and offsite disposal of contaminated surface soils will eliminate the potential for erosion and surface runoff of chemical contamination in the unnamed tributary. Further, this will eliminate the possibility of contaminant migration downstream to Patroon Creek. It is expected that once in place, surface runoff from the proposed removal areas will be of a quality sufficient to protect the designated uses of the unnamed tributary and Patroon Creek.

During the excavation and removal activities, protective barriers will be emplaced to eliminate the potential for contaminated soils eroded during rainfall or snowmelt to migrate and deposit in the unnamed tributary. These barriers are expected to prevent the contact of aquatic receptors with chemical contamination. As a result, no long-term adverse ecological impacts to aquatic flora and fauna are expected to occur as a result of the soil removal.

Radiological Toxicity

Note: the following is largely reprised from the Draft 1992 Baseline Risk Assessment for Contaminants at Colonie (ANL 1992).

A great deal of information is available for many species of plants and animals that show that, while some biological effects (e.g.: chromosomal aberrations and organ failure) are similar in different species, with the exception of warm-blooded species, most biota are more resistant to radiotoxicity effects than humans. Further, unless threatened or endangered species, critical members of the food web, or commercially important species are involved, or the losses place populations or the integrity of the ecosystem at risk, the loss of individual members of the plant or animal community is not normally a cause of concern. Most likely, the more important issue is the potential for plants and animals to serve as vectors in the transport of radioactive contaminants from the Colonie site to man or other biota.

The interaction of plants with radionuclides can occur by foliar absorption of radionuclides deposited on leaf and stem surfaces or by uptake from the plant root zone in the soil. Information describing uptake and accumulation of radionuclides by plants is limited and based mostly on short-term, relatively high-exposure laboratory experiments (Knight 1983 as cited in ANL 1992) that may not be applicable to long-term, low-level exposure conditions such as those at the Colonie site. Of the radionuclides found in the Site wastes, radium-226 appears to have the highest potential for uptake and accumulation by plants because it serves an analog for calcium, an essential plant nutrient (Knight 1983 as cited in ANL 1992). Lead-210 that is taken up by the plant roots will remain there, with little translocation to above ground plant parts (Knight 1983 as cited in ANL 1992).

Uptake of radionuclides by plants could lead to subsequent animal exposure via ingestion of contaminated vegetation. Small mammals or other animals that use the contaminated soil areas

can be considered vectors for the transport and redistribution of radioactive contamination. Excavation of contaminated soils by biota can bring the contaminants to the surface, while their burrows allow increased water infiltration. Additional modes of contaminant transport could include dispersal of animals with elevated levels of radionuclides, wind or water transport of contaminated soils brought to the surface by the animals, and movement of radionuclides by predators that feed on contaminated prey (Arthur, et al. 1986 as cited in ANL 1992).

A comparison of ecological impacts of the current preferred alternative (2B – Excavation and Offsite Disposal) with those of the previously preferred alternative (3B – On Site Containment in the Designated Area, DA) suggests that Alternative 2B will provide for a more protective remedy than its predecessor. Removal of contamination from the site more completely satisfies the requirements of 'toxicity reduction' and 'permanency' than on-site containment would provide. The complete excavation and removal of the chemical and radiological waste would more clearly preclude the possibility of future exposure with little need for maintenance and monitoring than that required of an on-site containment option.

APPENDIX J:

DG-4006 ALARA Analysis

APPENDIX J

Demonstrating Compliance with the Radiological Criteria for License Termination Using DG-4006

ALARA Analysis Summary

This ALARA cost-benefit comparison is based on the guidance presented by Regulatory Guide DG-4006. The ALARA analysis is based upon comparing an averted dose benefit in terms of present worth dollars against the cost of removal action. At the Colonie Site this includes soil removal, handling and transportation offsite for disposal, and addition of a 2 foot cover of clean soil. Storage of some soil may also occur. The soil removal alternatives are presented in section 5.0 of the main body of this report. A cost benefit ratio in excess of 1 is expected to be meet or exceed ALARA requirements as set forth by 10 CFR 20 Subpart E

ALARA Analysis Results

This ALARA analysis bases costs on data developed with earthVision software using site characterization information collected during the RI (Section 6.0). Soil is the primary factor in determining cost because the major project activities (i.e., excavation, analytical testing, onsite stabilization, offsite transportation and disposal, and site restoration) are directly related to the volume of material removed.

The ALARA analysis assumes dose based upon uranium since this is the principle radiological COC. The benefit of the averted dose ranges from $19,700 to $30,200 utilizing the $2,000 per person-rem and present worth techniques set forth in DG-4006. The averted dose is dependent upon the removal alternative chosen (Section 5.0). The costs associated with soil removal are presented in the comparative analysis of alternatives (Section 6.0).

The analysis presents cost benefit ratios ranging from 658 (industrial occupant, alternative 2B) to over 1,100 (resident farmer, either alternative 2B or 3B). The calculation used to arrive at this cost benefit ratio is conservative in that it assumes the entire 11.2 acres site is contaminated and the removal alternative chosen results in the largest land area associated with pathways to a member of the critical group. Further, it is conservatively assumed that for alternative 3B, the removed soil is available to cause dose should controls fail.

The cost benefit exceeds the ALARA cost benefit value of 1 for all cases considered. Table 1 summarizes the cost benefit ratios for the pathway scenarios and alternative. Calculation sheets are shown as Tables 2 through 7.

Conclusion

The residual radioactivity may be reduced to levels that are ALARA with respect to any of the alternatives examined. Conservative calculations indicate that the cost to benefit ratio is high and subsequently site removal actions for any of the alternatives will be ALARA.

Table 2

RESIDENT FARMER ALTERNATIVE 2B PARAMETERS for USE In ALARA ANALYSIS (DG-4006)

B_{AD} = \$2000 X PW ($AD_{COLLECTIVE}$) DG-4006 Eqn 11

Problem:
Remove soil at colonie site based upon Residential Farmer

Assumptions:
5.2.1 Alternative 2B – Large-Scale Excavation and Disposal (radioactive, organics, metals)
Asphalt slabs and concrete not included in removal costs (removed by others)
Resident Farmer Scenario volume of soil removed: 211,300 Cu Yds (5988 m^3)
Urban Resident Scenario volume of soil removed: 99,200 Cu Yds (2811 m^3)
Industrial Worker Scenario volume of soil removed: 86,600 Cu Yds (2454 m^3)
Site covers 11.2 acres (45348 m^2)

Alternative 2B Residential Farmer	\$34,700,000	Engineering estimate (Section 6.1.7)
Volume of soil removed, m^3	5988	
Dollar Cost	\$34,700,000	

$$PW(AD_{COLLECTIVE}) = P_D \times A \times 0.025 \times F \times (Conc/SCC_W) \times (1-e^{-(r+\lambda)N})/r+\lambda$$

$PW(AD_{COLLECTIVE})$, person-rem		**Assumptions**
P_D, Population Density for critical group, people/m^2	0.0004	Table 3.1 of DG-4006 - land, soil removal
A, Area being evaluated, m^2	45348	Entire site is assume to have some soil removed (conservative, maximizes collective dose)
0.025, annual dose to ave member of critical group from residual at soil cleanup criteria SCC_W, rem/yr	0.025	DG-4006 section 3.1.1
F, fraction of residual radioactivity removed by remediation	1	full removal
Conc, ave conc of residual radioactivity in the area being evaluated, units/unit area for bldgs or units/unit volume for soils	37	pCi/g — Remediate to cleanup criteria
SCC_W, soil cleanup criteria equivalent to 25 mrem/yr in same units as "Conc"	37	pCi/g — Assume all Uranium 238
r, monetary discount rate, yr^{-1}	0.03	Table 3.1 of DG-4006
λ, radiological decay constant, yr^{-1}	1.55E-10	U-238
N, number of years over which collective dose will be calculated	1000	Table 3.1 of DG-4006
$PW(AD_{COLLECTIVE})$ =	15.1	person-rem

B_{AD} = \$2000 X PW ($AD_{COLLECTIVE}$)

Then benefit from averted dose	\$30,232
COST/BENEFIT Value	1,147.79

Table 4

INDUSTRIAL OCCUPANT ALTERNATIVE 2B PARAMETERS FOR USE IN ALARA ANALYSIS (DG-4006)

B_{AD} = \$2000 X PW ($AD_{COLLECTIVE}$) DG-4006 Eqn 11

Problem:
Remove soil at colonie site based upon Industrial Occupant

Assumptions:
5.2.1 Alternative 2B – Large-Scale Excavation and Disposal (radioactive, organics, metals)
Asphalt slabs and concrete not included in removal costs (removed by others)
Resident Farmer Scenario volume of soil removed: 211,300 Cu Yds (5988 m^3)
Urban Resident Scenario volume of soil removed: 99,200 Cu Yds (2811 m^3)
Industrial Worker Scenario volume of soil removed: 86,600 Cu Yds (2454 m^3)
Site covers 11.2 acres (45348 m^2)

Alternative 2B Industrial Occupant	\$19,900,000	Engineering estimate (Section 6.1.7)
Volume of soil removed, m^3	2454	
Dollar Cost	\$19,900,000	

$$PW(AD_{COLLECTIVE}) = P_D \times A \times 0.025 \times F \times (Conc/SCC_W) \times (1-e^{-(r+\lambda)N})/r+\lambda$$

		Assumptions	
$PW(AD_{COLLECTIVE})$, person-rem			
P_D, Population Density for critical group, people/m^2	0.0004	Table 3.1 of DG-4006 - land, soil removal	
A, Area being evaluated, m^2	45348	Entire site is assume to have some soil removed (conservative, maximizes collective dose)	
0.025, annual dose to ave member of critical group from residual at soil cleanup criteria SCC_W, rem/yr	0.025	DG-4006 section 3.1.1	
F, fraction of residual radioactivity removed by remediation	1	*full removal*	
Conc, ave conc of residual radioactivity in the area being evaluated, units/unit area for bldgs or units/unit volume for soils	1.10	pCi/g	Remediate to cleanup criteria
SCC_W, soil cleanup criteria equivalent to 25 mrem/yr in same units as "Conc"	1.10	pCi/g	Assume all Uranium 238
r, monetary discount rate, yr^{-1}	0.03	Table 3.1 of DG-4006	
λ, radiological decay constant, yr^{-1}	1.56E-10	U-238	
N, number of years over which collective dose will be calculated	1000	Table 3.1 of DG-4006	
$PW(AD_{COLLECTIVE})$ =	15.1	person-rem	

B_{AD} = \$2000 X PW ($AD_{COLLECTIVE}$)

Then benefit from averted dose	\$30,232
COST/BENEFIT Value	658.24

Table 6

URBAN RESIDENT ALTERNATIVE 3B PARAMETERS FOR USE IN ALARA ANALYSIS (DG-4006)

B_{AD} = \$2000 X PW ($AD_{COLLECTIVE}$) DG-4006 Eqn 11

Problem:
Remove soil at colonie site based upon Urban Resident

Assumptions:
Alternative 3B – Moderate Excavation and Cap and Cover
Asphalt slabs and concrete not included in removal costs (removed by others)
Resident Farmer Scenario volume of soil removed: 211,300 Cu Yds (5988 m^3)
Urban Resident Scenario volume of soil removed: 99,200 Cu Yds (2811 m^3)
Industrial Worker Scenario volume of soil removed: 86,600 Cu Yds (2454 m^3)
Site covers 11.2 acres (45348 m^2)

Alternative 3B Urban Resident	[redacted]	Engineering estimate (Section 6.1.7)
Volume of soil removed, m^3	2811	
Dollar Cost	[redacted]	

$$PW(AD_{COLLECTIVE}) = P_D \times A \times 0.025 \times F \times (Conc/SCC_W) \times (1-e^{-(r+\lambda)N})/r+\lambda$$

$PW(AD_{COLLECTIVE})$, person-rem		Assumptions
P_D, Population Density for critical group, people/m^2	[redacted]	Table 3.1 of DG-4006 - land, soil removal
A, Area being evaluated, m^2	[redacted]	Entire site is assume to have some soil removed (conservative, maximizes collective dose)
0.025, annual dose to ave member of critical group from residual at soil cleanup criteria SCC_w, rem/yr	[redacted]	DG-4006 section 3.1.1
F, fraction of residual radioactivity removed by remediation	[redacted]	Assumer 30,000 Cu Yds stored onsite
Conc, ave conc of residual radioactivity in the area being evaluated, units/unit area for bldgs or units/unit volume for soils	[redacted]	pCi/g — Remediate to cleanup criteria
SCC_w, soil cleanup criteria equivalent to 25 mrem/yr in same units as "Conc"	[redacted]	pCi/g — Assume all Uranium 238
r, monetary discount rate, yr^{-1}	[redacted]	Table 3.1 of DG-4006
λ, radiological decay constant, yr^{-1}	[redacted]	U-238
N, number of years over which collective dose will be calculated	[redacted]	Table 3.1 of DG-4006
$PW(AD_{COLLECTIVE})$ =	10.6	person-rem

B_{AD} = \$2000 X PW ($AD_{COLLECTIVE}$)

Then benefit from averted dose	\$21,162
COST/BENEFIT Value	812.76

APPENDIX K:

Cost Estimation Details

COSTING ASSUMPTIONS

Colonie, NY FUSRAP Site

Alternatives 2B and 3B:

General Assumptions

1. Work performed in Level D. Labor productivity reduced to 90%.
2. During excavation, periodic qualitative screening of soil to further delineate the extent of contamination will be performed. Excavation equipment productivity reduced to 75%.
3. Soil material to be excavated is 50% granular and 50% cohesive.
4. Soil that does not meet cleanup criteria during confirmatory sampling is assumed to meet TCLP criteria.
5. Soil conversion from volume to weight is 1.2 tons per cy.
6. Expansion factor for insitu to exsitu soil volume is 1.2.
7. Expansion factor for stabilized soil volume is 1.1.
8. All radiologically-impacted soil exceeding cleanup levels will be excavated and metals-impacted soil exceeding cleanup levels will be excavated from 0 – 9 ft bgs.
9. Indirect construction costs assumed as percentage of direct construction costs less "Offsite Soil Transport & Disposal" costs as follows:
   a. Permitting and legal support @ 5%.
   b. Health and safety @ 10%.
   c. Construction management @ 10%.
   d. Quality assurance and oversight @ 10%.
   e. Bid and scope contingencies @ 10%.
   f. Certification of construction report @ 5%.
   g. Surveying/GPS @ 10%.
   h. Office project management @ 10%.
   i. Miscellaneous (ODCs) @ 5%.
   j. Health physics support @ 5%.
   k. General contingency @ 10%.
10. USACE-negotiated disposal rates:
    a. Low level radioactive waste (LLRW) @ $149.50/cy.
    b. Mixed waste (MW) @ $660.00/cy.
    c. Low Activity Radiological Material (LARM) @ $71.50/cy.
    d. Subtitle D facility: Base on local rates.
    e. Overpack drum (LLRW) @ $300/drum.

Colonie, NY FUSRAP Site

Alternative 2B:
Large-Scale Excavation and Disposal (Radiological, Organics, and Metals)

Scope and Assumptions

1. No removal and disposal of asphalt or concrete is required. Task completed by others.
2. No groundwater treatment is required except water extracted to facilitate excavation of soil.
3. No additional extent of contamination investigation is required.
4. Costs for engineering design and planning documents are not included. Task completed by others.
5. Costs for mobilization and site preparation are not included. Costs incurred under previous site work.
6. Buried drums repackaged and sent for offsite disposal. Assume 25 drums of LLRW.
7. Divert un-named tributary. Plug and abandon existing culvert.
8. Dewater excavation. Use existing wastewater treatment plant constructed by others. Well points for dewatering installed under previous site work.
9. Excavation of impacted soils. Reduced productivity for wet and cohesive soils.
   a. Excavate radioactive, metals, and mixed soils from DA.
   b. Transport from DA to stockpile areas.
   c. Excavate radioactive, metals, and mixed soils from Eastern Area.
   d. Transport from Eastern Area to stockpile areas.
   e. Install cribbing/walers for area 50'x50'x30' deep.
10. Characterization of stockpiled soils. Assume 1 test for every 250 cy of soil. Seven day turnaround.
    a. Rad analysis of radioactive soils.
    b. TCLP analysis of metals soils.
    c. Rad and TCLP analysis of mixed soils.
11. Stabilization of metals soils. Assume 33% of excavated metals and mixed soil fails TCLP.
    a. Transport soil from stockpile areas to processing area.
    b. Process in pug mill with 3% by volume phosphoric acid and pH agent.
    c. Confirmation testing. Assume 1 test for every 250 cy of treated soil. Seven day turnaround.
    d. Transport from processing area to stockpile areas.
12. Confirmatory sampling of excavations. Assume 1 test for rad and metals for every 250 cy of soil. Seven day turnaround.
13. Additional excavation for unacceptable confirmation results. Assume at 5% of original soil volume removed. No stabilization required.
    a. Excavate radioactive, metals, and mixed soils from DA.
    b. Transport from DA to stockpile areas.
    c. Excavate radioactive, metals, and mixed soils from Eastern Area.
    d. Transport from Eastern Area to stockpile areas.
14. Confirmatory sampling of additional excavations. Assume 1 test for rad and metals for every 250 cy of soil. Seven day turnaround.
15. Transport soil for offsite disposal. Use rail loading facilities constructed by others.
    a. Transport soil from stockpile areas to loading area.
    b. Transport and dispose of soil as LLRW at Subtitle C facility.
    c. Transport and dispose of soil as LARM at Subtitle C facility.
16. Offsite disposal of VOC and SVOC soil. Assume 125 cy (150 tons).
    a. Characterization sampling. Assume 10 samples for VOC and SVOC. Seven day turnaround.
    b. Transport soil from stockpile areas to loading area.
    c. Transport and dispose of soil at Subtitle C facility (LARM).

17. Site restoration. Backfill with offsite certified clean fill, grade for drainage, and seed. Provide 2 ft of fill over excavated areas as cover.
    a. Purchase fill. Add 10% for compaction reduction.
    b. Spread, compact, and grade fill.
    c. Seed area.
18. Demobilization.
19. Post-closure activities for 30 year period.
    a. Quarterly groundwater monitoring at 10 wells. Rad and metals analysis. Data management and reports.
    b. Five year CERCLA reviews.

Colonie, NY FUSRAP Site

Alternative 3B:
Moderate Excavation and Cap and Cover

Scope and Assumptions

1. No removal and disposal of asphalt or concrete is required. Task completed by others.
2. No groundwater treatment is required except water extracted to facilitate excavation of soil.
3. No additional extent of contamination investigation is required.
4. Costs for engineering design and planning documents are not included. Task completed by others.
5. Costs for mobilization and site preparation are not included. Costs incurred under previous site work.
6. Buried drums repackaged and sent for offsite disposal. Assume 25 drums of LLRW.
7. Divert un-named tributary. Plug and abandon existing culvert.
8. Dewater excavation. Use existing wastewater treatment plant constructed by others. Well points for dewatering installed under previous site work.
9. Excavation of impacted soils. Reduced productivity for wet and cohesive soils.
   a. Excavate radioactive, metals, and mixed soils from DA.
   b. Transport from DA to stockpile areas.
   c. Excavate radioactive, metals, and mixed soils from Eastern Area.
   d. Transport from Eastern Area to stockpile areas.
   e. Install cribbing/walers for area 50'x50'x30' deep.
10. Characterization of stockpiled soils. Assume 1 test for every 250 cy of soil. Seven day turnaround.
    a. Rad analysis of radioactive soils.
    b. TCLP analysis of metals soils.
    c. Rad and TCLP analysis of mixed soils.
11. Stabilization of metals soils. Assume 33% of excavated metals and mixed soil fails TCLP.
    a. Transport soil from stockpile areas to processing area.
    b. Process in pug mill with 3% by volume phosphoric acid and pH agent.
    c. Confirmation testing. Assume 1 test for every 250 cy of treated soil. Seven day turnaround.
    d. Transport from processing area to stockpile areas.
12. Confirmatory sampling of excavations. Assume 1 test for rad and metals for every 250 cy of soil. Seven day turnaround.
13. Additional excavation for unacceptable confirmation results. Assume at 5% of original soil volume removed. No stabilization required.
    a. Excavate radioactive, metals, and mixed soils from DA.
    b. Transport from DA to stockpile areas.
    c. Excavate radioactive, metals, and mixed soils from Eastern Area.
    d. Transport from Eastern Area to stockpile areas.
14. Confirmatory sampling of additional excavations. Assume 1 test for rad and metals for every 250 cy of soil. Seven day turnaround.
15. Onsite disposal of soil in DA. Height of 24 ft. Disposal capacity of 32,400 cy.
    a. Transport soil from stockpile areas to DA.
    b. Place and compact soil in DA.
16. Construct composite cover system over DA.
    a. 18 inches of compacted clay.
    b. 12 oz/sy non-woven geotextile.
    c. 40 mil smooth PVC geomembrane.
    d. Drainage net.
    e. 6 oz/sy non-woven geotextile.
    f. 24 inches of soil barrier protection layer.
    g. 6 inches of topsoil.
    h. Vegetative cover.

17. Transport soil for offsite disposal. Use rail loading facilities constructed by others.
    a. Transport soil from stockpile areas to loading area.
    b. Transport and dispose of soil as LLRW at Subtitle C facility.
    c. Transport and dispose of soil as LARM at Subtitle C facility.
18. Offsite disposal of VOC and SVOC soil. Assume 125 cy (150 tons).
    a. Characterization sampling. Assume 10 samples for VOC and SVOC. Seven day turnaround.
    b. Transport soil from stockpile areas to loading area.
    c. Transport and dispose of soil at Subtitle C facility (LARM).
19. Install network of 10 groundwater monitoring wells. Five in upper sand, five in lower sand.
20. Site restoration. Backfill with offsite certified clean fill, grade for drainage, and seed. Provide 2 ft of fill over excavated areas as cover.
    a. Purchase fill. Add 10% for compaction reduction.
    b. Spread, compact, and grade fill.
    c. Seed area.
21. Demobilization.
22. Post-closure activities for 30 year period.
    a. Maintenance of cover system over DA.
    b. Quarterly groundwater monitoring at 10 wells. Rad and metals analysis. Data management and reports.
    c. Five year CERCLA reviews.

ALTERNATIVE 2B, RESIDENT FARMER

Job Description: Colonie 2B Resident Farmr

Proposal Date:
Time:

From: ROY F. WESTON, INC.

Bid Item Number	Bid Item Description	Quantity	UM	Unit Price	Total Price
10	Mobilization & Site Preparation	1.0000	LS	0.00	**0.00**
20	Buried Drums	25.0000	EA	566.04	**14,151.00**
30	Divert Tributary	1.0000	LS	121,596.00	**121,596.00**
40	Dewater Excavation	1.0000	LS	602,431.23	**602,431.23**
50	Excavation	1.0000	LS	932,030.40	**932,030.40**
60	Characterization of Stockpiled Soils	1.0000	LS	679,380.00	**679,380.00**
70	Stabilization of Lead Soils	1.0000	LS	1,838,710.69	**1,838,710.69**
80	Confirmatory Sampling	1.0000	LS	490,100.00	**490,100.00**
90	Additional Excavation	1.0000	LS	35,344.24	**35,344.24**
100	Confirmatory Sampling AE	1.0000	LS	24,360.00	**24,360.00**
110	Transport & Dispose Offsite	1.0000	LS	47,473,484.04	**47,473,484.04**
120	Offsite Disposal VOC,SVOC	1.0000	LS	31,878.71	**31,878.71**
125	Groundwater Monitoring Wells	10.0000	EA	2,500.00	**25,000.00**
130	Site Restoration	1.0000	LS	2,792,101.48	**2,792,101.48**
140	Demobilize	1.0000	LS	20,360.00	**20,360.00**
	Direct Construction Cost			Subtotal Running Total	**55,080,927.79** **55,080,927.79**
150	Indirect Construction Cost	1.0000	LS	6,846,696.00	**6,846,696.00**
	Indirect Construction Cost			Subtotal Running Total	**6,846,696.00** **61,927,623.79**
200	Post Closure Activites (Present Worth)	1.0000	LS	875,876.30	**875,876.30**
				GRAND TOTAL	**62,803,500.09**

Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
10 Detaile			Mobilization & Site Prep	1.00	LS													
20 Detaile			Buried Drums	25.00	EA		536.00				240.00	4,625.00		8,750.00			566	14,151
20 Detaile	1		Repackage Drums	25.00	EA		536.00				240.00	4,625.00					216	5,401
LIST Cost Detail																		
	1.0	MOVERPAC	Overpac Drums	25.00	EA	U						185.00					185	4,625
			UCC to Activity:			U						185.00					185	4,625
			Resource List UCC to Activity:			U						185.00					185	4,625
CREW Cost Detail																		
	2.0 Days		12.5000 EA/Da	0.0800 Da/EA			388.00 Cost/Da											
	2.0 Shifts		12.5000 EA/Sh	0.0800 Sh/EA			388.00 Cost/Sh											
	16.0 Hours		1.5625 EA/Hr	0.6400 Hr/EA			48.50 Cost/Hr											
	1.0	LWSLAB	Site Laborer	16.00	HR	U	14.64										15	234
			UCC to Activity:			U	9.37										9	234
	1.0	LWSLOP	Equipment Operator	16.00	HR	U	18.86										19	302
			UCC to Activity:			U	12.07										12	302
	1.0	RBACKHOE	Backhoe JD 710	16.00	HR	U					15.00						15	240
			UCC to Activity:			U					9.60						10	240
			Resource List Hour Rate:			U	33.50				15.00						49	
			Resource List UCC to Activity:			U	21.44				9.60						31	776
20 Detaile	2		Offsite Transport&Dispose	25.00	EA									8,750.00			350	8,750
LIST Cost Detail																		
	1.0	UT&DRUM	T&D Envirocare UT Drums	25.00	EA	U								350.00			350	8,750
			UCC to Activity:			U								350.00			350	8,750
			Resource List UCC to Activity:			U								350.00			350	8,750
30 Detaile			Divert Tributary	1.00	LS		4,556.00				16,440	58,600		42,000			121,596	121,596
30 Detaile	1		Divert Pipeline	1,000.00	LF		4,020.00				16,200	58,000		42,000			120	120,220
LIST Cost Detail																		
	1.0	UHORZBOR	Horizontal Boring	100.00	LF	U								420.00			420	42,000
			UCC to Activity:			U								42.00			42	42,000
	1.0	M4'DPIPE	4'dia. pipe	1,000.00	LF	U						58.00					58	58,000
			UCC to Activity:			U						58.00					58	58,000
			Resource List UCC to Activity:			U						58.00		42.00			100	100,000
CREW Cost Detail																		
	Note:		Excavate & Backfill for new pipe. Horizontal Bore under Railroad Tracks.															
	15.0 Days		66.6667 LF/Da	0.0150 Da/LF			1348.00 Cost/Da											
	15.0 Shifts		66.6667 LF/Sh	0.0150 Sh/LF			1348.00 Cost/Sh											
	120.0 Hours		8.3333 LF/Hr	0.1200 Hr/LF			168.50 Cost/Hr											
	1.0	LWSLAB	Site Laborer	120.00	HR	U	14.64										15	1,757
			UCC to Activity:			U	1.76										2	1,757
	1.0	LWSLOP	Equipment Operator	120.00	HR	U	18.86										19	2,263
			UCC to Activity:			U	2.26										2	2,263
	1.0	RBACKHOE	Backhoe JD 710	120.00	HR	U					15.00						15	1,800
			UCC to Activity:			U					1.80						2	1,800
	1.0	RCRANE	Crane W/Operator	120.00	HR	U					120.00						120	14,400
			UCC to Activity:			U					14.40						14	14,400
			Resource List Hour Rate:			U	33.50				135.00						169	
			Resource List UCC to Activity:			U	4.02				16.20						20	20,220
30 Detaile	2		Plug & Abandon Ex.Culvert	2.00	EA		536.00				240.00	600.00					688	1,376
LIST Cost Detail																		
	1.0	MPLUGS	48" Plugs	2.00	EA	U						300.00					300	600
			UCC to Activity:			U						300.00					300	600
			Resource List UCC to Activity:			U						300.00					300	600
CREW Cost Detail																		

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Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
	2.0 Days	1.0000 EA/Da	1.0000 Da/EA				388.00 Cost/Da										
	2.0 Shifts	1.0000 EA/Sh	1.0000 Sh/EA				388.00 Cost/Sh										
	16.0 Hours	0.1250 EA/Hr	8.0000 Hr/EA				48.50 Cost/Hr										
1.0	LWSLAB	Site Laborer	16.00	HR	U	14.64										15	234
		UCC to Activity:			U	117.12										117	234
1.0	LWSLOP	Equipment Operator	16.00	HR	U	18.86										19	302
		UCC to Activity:			U	150.88										151	302
1.0	RBACKHOE	Backhoe JD 710	16.00	HR	U					15.00						15	240
		UCC to Activity:			U					120.00						120	240
		Resource List Hour Rate:			U	33.50				15.00						49	
		Resource List UCC to Activity:			U	268.00				120.00						388	776
40		Dewater Excavation	1.00	LS		509,600							92,831		602,431	602,431	
Detaile																	
40	1	Operator 24hr/day	70.00	WK		352,800										5,040	352,800
Detaile																	
LIST Cost Detail																	
	Note:	Operate 24 hours/day															
	1470.0 Days	0.0476 WK/Da	21.0000 Da/WK				240.00 Cost/Da										
	1470.0 Shifts	0.0476 WK/Sh	21.0000 Sh/WK				240.00 Cost/Sh										
	11760.0 Hours	0.0060 WK/Hr	168.0000 Hr/WK				30.00 Cost/Hr										
1.0	LDWOPER	Dewatering Operator	11,760	HR	U	30.00										30	352,800
		UCC to Activity:			U	5,040.00										5,040	352,800
		Weighted Average Hour Rate:			U	30.00										30	
		Resource List UCC to Activity:			U	5,040.00										5,040	352,800
40	2	Change Carbon	16.00	MO									48,000			3,000	48,000
Detaile																	
LIST Cost Detail																	
	Note:	Change carbon monthly															
1.0	UCARCHNG	Carbon Changeouts	16.00	EA	U								3,000.00			3,000	48,000
		UCC to Activity:			U								3,000.00			3,000	48,000
		Resource List UCC to Activity:			U								3,000.00			3,000	48,000
40	3	Night Shift Supervisor	70.00	WK		156,800										2,240	156,800
Detaile																	
LIST Cost Detail																	
	Note:	Night shift supervisor 8 hr/day															
	490.0 Days	0.1429 WK/Da	7.0000 Da/WK				320.00 Cost/Da										
	490.0 Shifts	0.1429 WK/Sh	7.0000 Sh/WK				320.00 Cost/Sh										
	3920.0 Hours	0.0179 WK/Hr	56.0000 Hr/WK				40.00 Cost/Hr										
1.0	LDWNOPER	Dewatering Operator Nite	3,920.00	HR	U	40.00										40	156,800
		UCC to Activity:			U	2,240.00										2,240	156,800
		Weighted Average Hour Rate:			U	40.00										40	
		Resource List UCC to Activity:			U	2,240.00										2,240	156,800
40	4	Electricity for Pumps	16.00	MO									36,191			2,262	36,191
Detaile																	
LIST Cost Detail																	
1.0	UELECTKW	Electricity	10,752	HR	U								3.37			3	36,191
		UCC to Activity:			U								2,261.95			2,262	36,191
		Resource List UCC to Activity:			U								2,261.95			2,262	36,191
40	5	Misc. Electric Charge	16.00	MO									3,840.00			240	3,840
Detaile																	
LIST Cost Detail																	
1.0	UMISCELE	Misc. Electric Charge	16.00	MO	U								240.00			240	3,840
		UCC to Activity:			U								240.00			240	3,840
		Resource List UCC to Activity:			U								240.00			240	3,840
40	6	Water Treatment Analysis	16.00	EA									4,800.00			300	4,800
Detaile																	
LIST Cost Detail																	
1.0	UWTRANAL	Water Treatment Analysis	16.00	EA	U								300.00			300	4,800
		UCC to Activity:			U								300.00			300	4,800
		Resource List UCC to Activity:			U								300.00			300	4,800

Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
50 Detaile		Excavation	1.00	LS		138,230				547,800			246,000			932,030	932,030
50 Detaile	1	Exc,Stockpile Soil/DA	139,612	CY		91,315				361,880						3	453,196
CREW Cost Detail																	
	218.0 Days	640.4220 CY/Da	0.0016 Da/CY			2078.88 Cost/Da											
	218.0 Shifts	640.4220 CY/Sh	0.0016 Sh/CY			2078.88 Cost/Sh											
	1744.0 Hours	80.0528 CY/Hr	0.0125 Hr/CY			259.86 Cost/Hr											
	2.0 LWSLOP	Equipment Operator	3,488.00	HR	U	18.86										19	65,784
			UCC to Activity:		U	0.47										0	65,784
	2.0 REXC330	Excavator CAT 325B	3,488.00	HR	U					82.50						83	287,760
			UCC to Activity:		U					2.06						2	287,760
	1.0 LWSLAB	Site Laborer	1,744.00	HR	U	14.64										15	25,532
			UCC to Activity:		U	0.18										0	25,532
	1.0 RARTDUMP	Articulating Dump Truck	1,744.00	HR	U					42.50						43	74,120
			UCC to Activity:		U					0.53						1	74,120
		Resource List Hour Rate:			U	52.36				207.50						260	
		Resource List UCC to Activity:			U	0.65				2.59						3	453,196
50 Detaile	2	Exc,Stockpile Soil/BA	71,613	CY		46,914				185,920						3	232,835
CREW Cost Detail																	
	112.0 Days	639.4018 CY/Da	0.0016 Da/CY			2078.88 Cost/Da											
	112.0 Shifts	639.4018 CY/Sh	0.0016 Sh/CY			2078.88 Cost/Sh											
	896.0 Hours	79.9252 CY/Hr	0.0125 Hr/CY			259.86 Cost/Hr											
	2.0 LWSLOP	Equipment Operator	1,792.00	HR	U	18.86										19	33,797
			UCC to Activity:		U	0.47										0	33,797
	2.0 REXC330	Excavator CAT 325B	1,792.00	HR	U					82.50						83	147,840
			UCC to Activity:		U					2.06						2	147,840
	1.0 LWSLAB	Site Laborer	896.00	HR	U	14.64										15	13,117
			UCC to Activity:		U	0.18										0	13,117
	1.0 RARTDUMP	Articulating Dump Truck	896.00	HR	U					42.50						43	38,080
			UCC to Activity:		U					0.53						1	38,080
		Resource List Hour Rate:			U	52.36				207.50						260	
		Resource List UCC to Activity:			U	0.66				2.60						3	232,835
50 Detaile	7	Install Cribbing/Walers	6,000.00	SF									246,000			41	246,000
LIST Cost Detail																	
	1.0 UCRIBWAL	Install Cribbing/Walers	6,000.00	SF	U								41.00			41	246,000
			UCC to Activity:		U								41.00			41	246,000
		Resource List UCC to Activity:			U								41.00			41	246,000
60 Detaile		Characterization	1.00	LS									679,380			679,380	679,380
60 Detaile	1	Rad Analysis Rad Soils	1,014.00	EA									405,600			400	405,600
LIST Cost Detail																	
	1.0 URADANAL	Rad Analysis	1,014.00	EA	U								400.00			400	405,600
			UCC to Activity:		U								400.00			400	405,600
		Resource List UCC to Activity:			U								400.00			400	405,600
60 Detaile	2	TCLP Analysis Lead Soil	1,014.00	EA									273,780			270	273,780
LIST Cost Detail																	
	1.0 UTCLPAN	TCLP Analysis	1,014.00	EA	U								270.00			270	273,780
			UCC to Activity:		U								270.00			270	273,780
		Resource List UCC to Activity:			U								270.00			270	273,780
70 Detaile		Stabilization	1.00	LS		70,824				796,384	451,621		519,880			1838711	1838711
70 Detaile	1	Transport Soil Stockpile	83,645	CY		32,672				53,040						1	85,713
CREW Cost Detail																	

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Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
	78.0 Days	1072.369 CY/Da		0.0009 Da/CY				1098.88 Cost/Da										
	78.0 Shifts	1072.369 CY/Sh		0.0009 Sh/CY				1098.88 Cost/Sh										
	624.0 Hours	134.0462 CY/Hr		0.0075 Hr/CY				137.36 Cost/Hr										
	1.0	LWSLAB	Site Laborer	624.00	HR	U	14.64										15	9,135
				UCC to Activity:		U	0.11										0	9,135
	2.0	LWSLOP	Equipment Operator	1,248.00	HR	U	18.86										19	23,537
				UCC to Activity:		U	0.28										0	23,537
	2.0	RARTDUMP	Articulating Dump Truck	1,248.00	HR	U					42.50						43	53,040
				UCC to Activity:		U					0.63						1	53,040
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.39				0.63						1	85,713
70	2		Pug Mill Process	83,645	CY						681,409	451,621		420,520			19	1553551
Detaile																		
LIST Cost Detail																		
	1.0	UPUGMOB	Mob/Maintain Pug Mill	7.20	LS	U								18,400			18,400	132,480
				UCC to Activity:		U								1.58			2	132,480
	1.0	UPUGRENT	Pug Mill Rental	28.80	MO	U					9,660.00						9,660	278,209
				UCC to Activity:		U					3.33						3	278,209
	1.0	UPHOSACD	Phosphoric Acid,pH agent	1,010.81	TN	U						150.00					150	451,621
				UCC to Activity:		U						5.40					5	451,621
	1.0	UACIDPMP	Acid Pump Rental	28.80	MO	U					10,000						10,000	288,001
				UCC to Activity:		U					3.44						3	288,001
	1.0	USTORAGE	Storage of acid,pH red.ag	7.20	LS	U								10,000			10,000	72,000
				UCC to Activity:		U								0.86			1	72,000
	1.0	UPWRPUGM	Power for Pug Mill	7.20	LS	U								15,000			15,000	108,000
				UCC to Activity:		U								1.29			1	108,000
	1.0	UANCEQUP	Ancillary Equip.for Pug	28.80	MO	U					4,000.00						4,000	115,200
				UCC to Activity:		U					1.38						1	115,200
	1.0	ULOADSOL	Load soil into Pug Mill	83,645	CY	U								1.22			1	102,047
				UCC to Activity:		U								1.22			1	102,047
	1.0	ULOADPHS	Load Phosphoric in Pug	1,958.40	CY	U								1.53			2	2,996
				UCC to Activity:		U								0.04			0	2,996
	1.0	ULODPH	Load pH Reduct in Pug	1,958.40	CY	U								1.53			2	2,996
				UCC to Activity:		U								0.04			0	2,996
			Resource List UCC to Activity:			U					8.15	5.40		5.03			19	1553551
70	3		Confirmation Testing	368.00	EA									99,360			270	99,360
Detaile																		
LIST Cost Detail																		
	1.0	UTCLPAN	TCLP Analysis	368.00	EA	U								270.00			270	99,360
				UCC to Activity:		U								270.00			270	99,360
			Resource List UCC to Activity:			U								270.00			270	99,360
70	4		Transport to Stockpile	92,010	CY		38,151				61,934						1	100,087
Detaile																		
CREW Cost Detail																		
	91.1 Days	1010.203 CY/Da		0.0010 Da/CY				1098.88 Cost/Da										
	91.1 Shifts	1010.203 CY/Sh		0.0010 Sh/CY				1098.88 Cost/Sh										
	728.6 Hours	126.2754 CY/Hr		0.0079 Hr/CY				137.36 Cost/Hr										
	1.0	LWSLAB	Site Laborer	728.65	HR	U	14.64										15	10,667
				UCC to Activity:		U	0.12										0	10,667
	2.0	LWSLOP	Equipment Operator	1,457.29	HR	U	18.86										19	27,485
				UCC to Activity:		U	0.30										0	27,485
	2.0	RARTDUMP	Articulating Dump Truck	1,457.29	HR	U					42.50						43	61,935
				UCC to Activity:		U					0.67						1	61,935
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.41				0.67						1	100,087
80			Confirmatory Sampling	1.00	LS									490,100			490,100	490,100
Detaile																		
80	1		Confirmatory Sampling	845.00	EA									490,100			580	490,100
Detaile																		
LIST Cost Detail																		
	1.0	URADANAL	Rad Analysis	845.00	EA	U								400.00			400	338,000
				UCC to Activity:		U								400.00			400	338,000
	1.0	UMETLANL	Metals Analysis	845.00	EA	U								180.00			180	152,100
				UCC to Activity:		U								180.00			180	152,100
			Resource List UCC to Activity:			U								580.00			580	490,100

Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
90 Detaile			Additional Excavation	1.00	LS		7,121.62				28,222						35,344	35,344
90 Detaile	1		Exc,Stockpile Soil/DA	6,981.00	CY		4,608.34				18,262						3	22,871
CREW Cost Detail																		
	11.0 Days		634.5455 CY/Da	0.0016 Da/CY			2078.88 Cost/Da											
	11.0 Shifts		634.5455 CY/Sh	0.0016 Sh/CY			2078.88 Cost/Sh											
	88.0 Hours		79.3182 CY/Hr	0.0126 Hr/CY			259.86 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	176.03	HR	U	18.86										19	3,320
				UCC to Activity:		U	0.48										0	3,320
	2.0	REXC330	Excavator CAT 325B	176.03	HR	U					82.50						83	14,522
				UCC to Activity:		U					2.08						2	14,522
	1.0	LWSLAB	Site Laborer	88.01	HR	U	14.64										15	1,289
				UCC to Activity:		U	0.18										0	1,289
	1.0	RARTDUMP	Articulating Dump Truck	88.01	HR	U					42.50						43	3,741
				UCC to Activity:		U					0.54						1	3,741
			Resource List Hour Rate:			U	52.36				207.50						260	
			Resource List UCC to Activity:			U	0.66				2.62						3	22,871
90 Detaile	2		Exc,Stockpile Soil/EA	3,581.00	CY		2,513.28				9,960.00						3	12,473
CREW Cost Detail																		
	6.0 Days		596.8333 CY/Da	0.0017 Da/CY			2078.88 Cost/Da											
	6.0 Shifts		596.8333 CY/Sh	0.0017 Sh/CY			2078.88 Cost/Sh											
	48.0 Hours		74.6042 CY/Hr	0.0134 Hr/CY			259.86 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	96.00	HR	U	18.86										19	1,811
				UCC to Activity:		U	0.51										1	1,811
	1.0	LWSLAB	Site Laborer	48.00	HR	U	14.64										15	703
				UCC to Activity:		U	0.20										0	703
	2.0	REXC330	Excavator CAT 325B	96.00	HR	U					82.50						83	7,920
				UCC to Activity:		U					2.21						2	7,920
	1.0	RARTDUMP	Articulating Dump Truck	48.00	HR	U					42.50						43	2,040
				UCC to Activity:		U					0.57						1	2,040
			Resource List Hour Rate:			U	52.36				207.50						260	
			Resource List UCC to Activity:			U	0.70				2.78						3	12,473
100 Detaile			Confirmatory Sampling AE	1.00	LS									24,360		24,360	24,360	24,360
100 Detaile	1		Confirmatory Sampling AE	42.00	EA									24,360		580	24,360	
LIST Cost Detail																		
	1.0	URADANAL	Rad Analysis	42.00	EA	U								400.00			400	16,800
				UCC to Activity:		U								400.00			400	16,800
	1.0	UMETLANL	Metals Analysis	42.00	EA	U								180.00			180	7,560
				UCC to Activity:		U								180.00			180	7,560
			Resource List UCC to Activity:			U								580.00			580	24,360
110 Detaile			T & D Offsi	1.00	LS		113,541				184,320		47175622				47473484	47473484
110 Detaile	1		Transport from Stockpile	274,508	CY		113,541				184,320						1	297,862
CREW Cost Detail																		
	271.1 Days		1012.722 CY/Da	0.0010 Da/CY			1098.88 Cost/Da											
	271.1 Shifts		1012.722 CY/Sh	0.0010 Sh/CY			1098.88 Cost/Sh											
	2168.5 Hours		126.5902 CY/Hr	0.0079 Hr/CY			137.36 Cost/Hr											
	1.0	LWSLAB	Site Laborer	2,168.48	HR	U	14.64										15	31,747
				UCC to Activity:		U	0.12										0	31,747
	2.0	LWSLOP	Equipment Operator	4,336.95	HR	U	18.86										19	81,795
				UCC to Activity:		U	0.30										0	81,795
	2.0	RARTDUMP	Articulating Dump Truck	4,336.95	HR	U					42.50						43	184,321
				UCC to Activity:		U					0.67						1	184,321
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.41				0.67						1	297,862

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Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
110	2		T & D Subtitle C (LLRW)	1,250.00	CY									311,875			250	311,875
Detaile																		
LIST Cost Detail																		
	1.0	UDISPEUT	Disposal Subtitle C(LLRW)	1,250.00	CY	U								149.50			150	186,875
				UCC to Activity:		U								149.50			150	186,875
	1.0	UTRANSPT	Transport by Rail	1,250.00	CY	U								100.00			100	125,000
				UCC to Activity:		U								100.00			100	125,000
			Resource List UCC to Activity:			U								249.50			250	311,875
110	3		T & D Subtitle C (LARM)	273,258	CY									46863747			172	46863747
Detaile																		
LIST Cost Detail																		
	1.0	UDISENSF	Disposal Subtitle C(LARM)	273,258	CY	U								71.50			72	19537947
				UCC to Activity:		U								71.50			72	19537947
	1.0	UTRANSPT	Transport by Rail	273,258	CY	U								100.00			100	27325800
				UCC to Activity:		U								100.00			100	27325800
			Resource List UCC to Activity:			U								171.50			172	46863747
110	4		T & D Soils Subtitle D LF	1.00	CY													
Detaile																		
LIST Cost Detail																		
	Note:		1 cy = 1.2 tons															
	1.0	UT&DSUBD	T & D Subtitle D Landfill	0.00	TN	U												
120			Offsite Disposal VOC,SVOC	1.00	LS		58.59				95.12			31,725		31,879		31,879
Detaile																		
120	1		Characterization Sampling	10.00	EA									6,000.00			600	6,000
Detaile																		
LIST Cost Detail																		
	1.0	UVOCANAL	VOC Analysis	10.00	EA	U								225.00			225	2,250
				UCC to Activity:		U								225.00			225	2,250
	1.0	USVOCANL	SVOC Analysis	10.00	EA	U								375.00			375	3,750
				UCC to Activity:		U								375.00			375	3,750
			Resource List UCC to Activity:			U								600.00			600	6,000
120	2		T & D Soils	150.00	TN									25,725			172	25,725
Detaile																		
LIST Cost Detail																		
	1.0	UT&DVOC	T & D VOC Soils	150.00	TN	U								171.50			172	25,725
				UCC to Activity:		U								171.50			172	25,725
			Resource List UCC to Activity:			U								171.50			172	25,725
120	3		Transport to Stockpile	150.00	CY		58.59				95.12						1	154
Detaile																		
CREW Cost Detail																		
	0.1 Days		1072.369 CY/Da	0.0009 Da/CY		1098.88 Cost/Da												
	0.1 Shifts		1072.369 CY/Sh	0.0009 Sh/CY		1098.88 Cost/Sh												
	1.1 Hours		134.0462 CY/Hr	0.0075 Hr/CY		137.36 Cost/Hr												
	1.0	LWSLAB	Site Laborer	1.12	HR	U	14.64										15	16
				UCC to Activity:		U	0.11										0	16
	2.0	LWSLOP	Equipment Operator	2.24	HR	U	18.86										19	42
				UCC to Activity:		U	0.28										0	42
	2.0	RARTDUMP	Articulating Dump Truck	2.24	HR	U					42.50						43	95
				UCC to Activity:		U					0.63						1	95
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.39				0.63						1	154
125			GW Monitoring Wells	10.00	EA									25,000			2,500	25,000
Detaile																		
125	1		GW Monitoring Wells	10.00	EA									25,000			2,500	25,000
Detaile																		
LIST Cost Detail																		
	1.0	UGWELLS	GW Monitoring Wells	10.00	EA	U								2,500.00			2,500	25,000
				UCC to Activity:		U								2,500.00			2,500	25,000
			Resource List UCC to Activity:			U								2,500.00			2,500	25,000

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Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
130 Detaile			Site Restoration	1.00	LS		127,724				457,379	2195685		11,312			2792101	2792101
130 Detaile	1		Fill Material	243,965	CY							2195685					9	2195685
LIST Cost Detail																		
	1.0	MFILLMTL	Fill Material	243,965	CY	U						9.00					9	2195685
				UCC to Activity:		U						9.00					9	2195685
			Resource List UCC to Activity:			U						9.00					9	2195685
130 Detaile	2		Spread,Compact,Grade Fill	243,965	CY		127,724				457,379						2	585,104
CREW Cost Detail																		
	304.9 Days		800.0964 CY/Da	0.0012 Da/CY			1918.88 Cost/Da											
	304.9 Shifts		800.0964 CY/Sh	0.0012 Sh/CY			1918.88 Cost/Sh											
	2439.4 Hours		100.0120 CY/Hr	0.0100 Hr/CY			239.86 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	4,878.71	HR	U	18.86										19	92,013
				UCC to Activity:		U	0.38										0	92,013
	1.0	LWSLAB	Site Laborer	2,439.36	HR	U	14.64										15	35,712
				UCC to Activity:		U	0.15										0	35,712
	2.0	RCOMPACT	Compactor CAT CS323C	4,878.71	HR	U					93.75						94	457,379
				UCC to Activity:		U					1.87						2	457,379
			Resource List Hour Rate:			U	52.36				187.50						240	
			Resource List UCC to Activity:			U	0.52				1.87						2	585,104
130 Detaile	3		Seed Area	12.50	AC									11,312			905	11,313
LIST Cost Detail																		
	1.0	USEED	Seeding	12.50	AC	U								905.00			905	11,313
				UCC to Activity:		U								905.00			905	11,313
			Resource List UCC to Activity:			U								905.00			905	11,313
140 Detaile			Demobilize	1.00	LS		5,360.00							15,000			20,360	20,360
LIST Cost Detail																		
	1.0	UDEMOBTR	Demob Trailers	6.00	EA	U								500.00			500	3,000
				UCC to Activity:		U								3,000.00			3,000	3,000
	1.0	UDEMOBEQ	Demob Equipment	10.00	EA	U								300.00			300	3,000
				UCC to Activity:		U								3,000.00			3,000	3,000
	1.0	UDISMUTL	Dismantle Utilities	1.00	LS	U								6,000.00			6,000	6,000
				UCC to Activity:		U								6,000.00			6,000	6,000
	1.0	UDISPOSL	Disposal of Debris	1.00	LS	U								3,000.00			3,000	3,000
				UCC to Activity:		U								3,000.00			3,000	3,000
			Resource List UCC to Activity:			U								15,000			15,000	15,000
CREW Cost Detail																		
	10.0 Days		0.1000 LS/Da	10.0000 Da/LS			536.00 Cost/Da											
	10.0 Shifts		0.1000 LS/Sh	10.0000 Sh/LS			536.00 Cost/Sh											
	80.0 Hours		0.0125 LS/Hr	80.0000 Hr/LS			67.00 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	160.00	HR	U	18.86										19	3,018
				UCC to Activity:		U	3,017.60										3,018	3,018
	2.0	LWSLAB	Site Laborer	160.00	HR	U	14.64										15	2,342
				UCC to Activity:		U	2,342.40										2,342	2,342
			Resource List Hour Rate:			U	67.00										67	
			Resource List UCC to Activity:			U	5,360.00										5,360	5,360
150 Detaile			Indirect Construct Cost	1.00	LS									6846696			6846696	6846696
150 Detaile	1		Permit & Legal (5%)	1.00	LS									380,372			380,372	380,372
LIST Cost Detail																		
	1.0	UPERMTLG	Permit & Legal 5%	1.00	LS	U								380,372			380,372	380,372
				UCC to Activity:		U								380,372			380,372	380,372
			Resource List UCC to Activity:			U								380,372			380,372	380,372

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ROY F. WESTON, INC.
COLSNY2B (Colonie 2B Resident Farmr)
Abbreviated Estimator's Report

Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
150	2	Health & Safety (10%)	1.00	LS									760,744			760,744	760,744
Detaile																	
LIST Cost Detail																	
1.0	UH&S	Health & Safety 10%	1.00	LS	U								760,744			760,744	760,744
		UCC to Activity:			U								760,744			760,744	760,744
		Resource List UCC to Activity:			U								760,744			760,744	760,744
150	3	Construct Management(10%)	1.00	LS									760,744			760,744	760,744
Detaile																	
LIST Cost Detail																	
1.0	UCONMGMT	Construct Management 10%	1.00	LS	U								760,744			760,744	760,744
		UCC to Activity:			U								760,744			760,744	760,744
		Resource List UCC to Activity:			U								760,744			760,744	760,744
150	4	QA & Oversight (10%)	1.00	LS									760,744			760,744	760,744
Detaile																	
LIST Cost Detail																	
1.0	UQA,OVST	QA & Oversight 10%	1.00	LS	U								760,744			760,744	760,744
		UCC to Activity:			U								760,744			760,744	760,744
		Resource List UCC to Activity:			U								760,744			760,744	760,744
150	5	Bid & Scope Conting.(10%)	1.00	LS									760,744			760,744	760,744
Detaile																	
LIST Cost Detail																	
1.0	UBIDSCPE	Bid & Scope Conting. 10%	1.00	LS	U								760,744			760,744	760,744
		UCC to Activity:			U								760,744			760,744	760,744
		Resource List UCC to Activity:			U								760,744			760,744	760,744
150	6	Cert.Consruct.Report (5%)	1.00	LS									380,372			380,372	380,372
Detaile																	
LIST Cost Detail																	
1.0	UCERTCRP	Cert.Construct Report 5%	1.00	LS	U								380,372			380,372	380,372
		UCC to Activity:			U								380,372			380,372	380,372
		Resource List UCC to Activity:			U								380,372			380,372	380,372
150	7	Surveying/GPS (10%)	1.00	LS									760,744			760,744	760,744
Detaile																	
LIST Cost Detail																	
1.0	USURVEYG	Survey/GPS 10%	1.00	LS	U								760,744			760,744	760,744
		UCC to Activity:			U								760,744			760,744	760,744
		Resource List UCC to Activity:			U								760,744			760,744	760,744
150	8	Office Proj. Mgmt (10%)	1.00	LS									760,744			760,744	760,744
Detaile																	
LIST Cost Detail																	
1.0	UPROJMGM	Office Project Manage 10%	1.00	LS	U								760,744			760,744	760,744
		UCC to Activity:			U								760,744			760,744	760,744
		Resource List UCC to Activity:			U								760,744			760,744	760,744
150	9	Miscellaneous (ODCs) (5%)	1.00	LS									380,372			380,372	380,372
Detaile																	
LIST Cost Detail																	
1.0	UMISC	Miscellanous ODC's 5%	1.00	LS	U								380,372			380,372	380,372
		UCC to Activity:			U								380,372			380,372	380,372
		Resource List UCC to Activity:			U								380,372			380,372	380,372
150	10	Health Physics Support-5%	1.00	LS									380,372			380,372	380,372
Detaile																	
LIST Cost Detail																	
1.0	UHEALPHY	Health Physics Sup. 5%	1.00	LS	U								380,372			380,372	380,372
		UCC to Activity:			U								380,372			380,372	380,372
		Resource List UCC to Activity:			U								380,372			380,372	380,372

Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
150	11	Gen.Contingency (10%)	1.00	LS									760,744			760,744	760,744
Detaile																	
LIST Cost Detail																	
1.0	UGENCONT	General Contingency 10%	1.00	LS	U								760,744			760,744	760,744
		UCC to Activity:			U								760,744			760,744	760,744
		Resource List UCC to Activity:			U								760,744			760,744	760,744
200		Post Closure Activity(PW)	1.00	LS									875,876			875,876	875,876
Detaile																	
200	1	Quarterly Monitoring Well	4.00	EA									805,776			201,444	805,776
Detaile																	
LIST Cost Detail																	
1.0	UGWMONOM	GW Monitoring sampling	1.62	LS	U								497,700			497,700	805,776
		UCC to Activity:			U								201,444			201,444	805,776
		Resource List UCC to Activity:			U								201,444			201,444	805,776
200	2	CERCLA Reviews	1.00	LS									70,100			70,100	70,100
Detaile																	
LIST Cost Detail																	
1.0	USUMREPT	Summary Report PresentWth	1.00	LS	U								70,100			70,100	70,100
		UCC to Activity:			U								70,100			70,100	70,100
		Resource List UCC to Activity:			U								70,100			70,100	70,100

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ALTERNATIVE 3B, RESIDENT FARMER

Job Description: Colonie 3B Redisent Frmr

Proposal Date:
Time:

From: ROY F. WESTON, INC.

Bid Item Number	Bid Item Description	Quantity	UM	Unit Price	Total Price
10	Mobilization & Site Preparation	1.0000	LS	0.00	0.00
20	Buried Drums	25.0000	EA	566.04	14,151.00
30	Divert Tributary	1.0000	LS	121,596.00	121,596.00
40	Dewater Excavation	1.0000	LS	602,431.23	602,431.23
50	Excavation	1.0000	LS	932,030.40	932,030.40
60	Characterization of Stockpiled Soils	1.0000	LS	679,380.00	679,380.00
70	Stabilization of Lead Soils	1.0000	LS	1,838,710.69	1,838,710.69
80	Confirmatory Sampling	1.0000	LS	490,100.00	490,100.00
90	Additional Excavation	1.0000	LS	35,344.24	35,344.24
100	Confirmatory Sampling AE	1.0000	LS	24,360.00	24,360.00
110	Onsite Disposal of Soil DA	1.0000	LS	75,460.64	75,460.64
120	Construct Composite Cover over DA	1.0000	LS	247,624.89	247,624.89
130	Transport & Dispose Offsite	1.0000	LS	41,920,058.50	41,920,058.50
140	Offsite Disposal VOC,SVOC	1.0000	LS	31,878.71	31,878.71
150	Groundwater Monitoring Wells	10.0000	EA	2,500.00	25,000.00
160	Site Restoration	1.0000	LS	2,790,291.43	2,790,291.43
170	Demobilization	1.0000	LS	20,360.00	20,360.00
	Direct Construction Cost			Subtotal	49,848,777.73
				Running Total	49,848,777.73
190	Indirect Construction Cost	1.0000	LS	7,135,848.00	7,135,848.00
	Indirect Construction Cost			Subtotal	7,135,848.00
				Running Total	56,984,625.73
200	Post Closure Activites (Present Worth)	1.0000	LS	1,266,376.30	1,266,376.30
				GRAND TOTAL	58,251,002.03

Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
10 Detaile			Mobilization & Site Prep	1.00	LS													
20 Detaile			Buried Drums	25.00	EA		536.00				240.00	4,625.00		8,750.00			566	14,151
20 Detaile	1		Repackage Drums	25.00	EA		536.00				240.00	4,625.00					216	5,401
LIST Cost Detail																		
	1.0	MOVERPAC	Overpac Drums	25.00	EA	U						185.00					185	4,625
				UCC to Activity:		U						185.00					185	4,625
			Resource List UCC to Activity:			U						185.00					185	4,625
CREW Cost Detail																		
	2.0 Days		12.5000 EA/Da	0.0800 Da/EA			388.00 Cost/Da											
	2.0 Shifts		12.5000 EA/Sh	0.0800 Sh/EA			388.00 Cost/Sh											
	16.0 Hours		1.5625 EA/Hr	0.6400 Hr/EA			48.50 Cost/Hr											
	1.0	LWSLAB	Site Laborer	16.00	HR	U	14.64										15	234
				UCC to Activity:		U	9.37										9	234
	1.0	LWSLOP	Equipment Operator	16.00	HR	U	18.86										19	302
				UCC to Activity:		U	12.07										12	302
	1.0	RBACKHOE	Backhoe JD 710	16.00	HR	U					15.00						15	240
				UCC to Activity:		U					9.60						10	240
			Resource List Hour Rate:			U	33.50				15.00						49	
			Resource List UCC to Activity:			U	21.44				9.60						31	776
20 Detaile	2		Offsite Trans&/Disposal	25.00	EA									8,750.00			350	8,750
LIST Cost Detail																		
	1.0	UT&DRUM	T&D Envirocare UT Drums	25.00	EA	U								350.00			350	8,750
				UCC to Activity:		U								350.00			350	8,750
			Resource List UCC to Activity:			U								350.00			350	8,750
30 Detaile			Divert Tributary	1.00	LS		4,556.00				16,440	58,600		42,000			121,596	121,596
30 Detaile	1		Divert Pipeline	1,000.00	LF		4,020.00				16,200	58,000		42,000			120	120,220
LIST Cost Detail																		
	1.0	UHORZBOR	Horizontal Boring	100.00	LF	U								420.00			420	42,000
				UCC to Activity:		U								42.00			42	42,000
	1.0	M4'DPIPE	4'dia. pipe	1,000.00	LF	U						58.00					58	58,000
				UCC to Activity:		U						58.00					58	58,000
			Resource List UCC to Activity:			U						58.00		42.00			100	100,000
CREW Cost Detail																		
	Note:		Excavate & Backfill for new pipe. Horizontal Bore under Railroad Tracks.															
	15.0 Days		66.6667 LF/Da	0.0150 Da/LF			1348.00 Cost/Da											
	15.0 Shifts		66.6667 LF/Sh	0.0150 Sh/LF			1348.00 Cost/Sh											
	120.0 Hours		8.3333 LF/Hr	0.1200 Hr/LF			168.50 Cost/Hr											
	1.0	LWSLAB	Site Laborer	120.00	HR	U	14.64										15	1,757
				UCC to Activity:		U	1.76										2	1,757
	1.0	LWSLOP	Equipment Operator	120.00	HR	U	18.86										19	2,263
				UCC to Activity:		U	2.26										2	2,263
	1.0	RBACKHOE	Backhoe JD 710	120.00	HR	U					15.00						15	1,800
				UCC to Activity:		U					1.80						2	1,800
	1.0	RCRANE	Crane W/Operator	120.00	HR	U					120.00						120	14,400
				UCC to Activity:		U					14.40						14	14,400
			Resource List Hour Rate:			U	33.50				135.00						169	
			Resource List UCC to Activity:			U	4.02				16.20						20	20,220
30 Detaile	2		Plug & Abandon Ex.Culvert	2.00	EA		536.00				240.00	600.00					688	1,376
LIST Cost Detail																		
	1.0	MPLUGS	48" Plugs	2.00	EA	U						300.00					300	600
				UCC to Activity:		U						300.00					300	600
			Resource List UCC to Activity:			U						300.00					300	600
CREW Cost Detail																		

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Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
	2.0 Days	1.0000 EA/Da	1.0000 Da/EA				388.00 Cost/Da										
	2.0 Shifts	1.0000 EA/Sh	1.0000 Sh/EA				388.00 Cost/Sh										
	16.0 Hours	0.1250 EA/Hr	8.0000 Hr/EA				48.50 Cost/Hr										
1.0	LWSLAB	Site Laborer	16.00	HR	U	14.64										15	234
		UCC to Activity:			U	117.12										117	234
1.0	LWSLOP	Equipment Operator	16.00	HR	U	18.86										19	302
		UCC to Activity:			U	150.88										151	302
1.0	RBACKHOE	Backhoe JD 710	16.00	HR	U					15.00						15	240
		UCC to Activity:			U					120.00						120	240
		Resource List Hour Rate:			U	33.50				15.00						49	
		Resource List UCC to Activity:			U	268.00				120.00						388	776
40		Dewater Excavation	1.00	LS		509,600							92,831			602,431	602,431
Detaile																	
40	1	Operator 24hr/day	70.00	WK		352,800										5,040	352,800
Detaile																	
LIST Cost Detail																	
	Note:	Operate 24 hous/day															
	1470.0 Days	0.0476 WK/Da	21.0000 Da/WK				240.00 Cost/Da										
	1470.0 Shifts	0.0476 WK/Sh	21.0000 Sh/WK				240.00 Cost/Sh										
	11760.0 Hours	0.0060 WK/Hr	168.0000 Hr/WK				30.00 Cost/Hr										
1.0	LDWOPER	Dewatering Operator	11,760	HR	U	30.00										30	352,800
		UCC to Activity:			U	5,040.00										5,040	352,800
		Weighted Average Hour Rate:			U	30.00										30	
		Resource List UCC to Activity:			U	5,040.00										5,040	352,800
40	2	Change Carbon	16.00	MO									48,000			3,000	48,000
Detaile																	
LIST Cost Detail																	
	Note:	Change carbon monthly															
1.0	UCARCHNG	Carbon Changeouts	16.00	EA	U								3,000.00			3,000	48,000
		UCC to Activity:			U								3,000.00			3,000	48,000
		Resource List UCC to Activity:			U								3,000.00			3,000	48,000
40	3	Night Shift Supervisor	70.00	WK		156,800										2,240	156,800
Detaile																	
LIST Cost Detail																	
	Note:	Night shift supervisor 8 hr/day															
	490.0 Days	0.1429 WK/Da	7.0000 Da/WK				320.00 Cost/Da										
	490.0 Shifts	0.1429 WK/Sh	7.0000 Sh/WK				320.00 Cost/Sh										
	3920.0 Hours	0.0179 WK/Hr	56.0000 Hr/WK				40.00 Cost/Hr										
1.0	LDWNOPER	Dewatering Operator Nite	3,920.00	HR	U	40.00										40	156,800
		UCC to Activity:			U	2,240.00										2,240	156,800
		Weighted Average Hour Rate:			U	40.00										40	
		Resource List UCC to Activity:			U	2,240.00										2,240	156,800
40	4	Electricity for Pumps	16.00	MO									36,191			2,262	36,191
Detaile																	
LIST Cost Detail																	
1.0	UELECTKW	Electricity	10,752	HR	U								3.37			3	36,191
		UCC to Activity:			U								2,261.95			2,262	36,191
		Resource List UCC to Activity:			U								2,261.95			2,262	36,191
40	5	Misc. Electric Charge	16.00	MO									3,840.00			240	3,840
Detaile																	
LIST Cost Detail																	
1.0	UMISCELR	Misc. Electric Charge	16.00	MO	U								240.00			240	3,840
		UCC to Activity:			U								240.00			240	3,840
		Resource List UCC to Activity:			U								240.00			240	3,840
40	6	Water Treatment Analysis	16.00	EA									4,800.00			300	4,800
Detaile																	
LIST Cost Detail																	
1.0	UWTRANAL	Water Treatment Analysis	16.00	EA	U								300.00			300	4,800
		UCC to Activity:			U								300.00			300	4,800
		Resource List UCC to Activity:			U								300.00			300	4,800

Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
50		Excavation	1.00	LS		138,230				547,800			246,000			932,030	932,030
Detaile																	
50	1	Exc,Stockpile Soil/DA	139,612	CY		91,315				361,880						3	453,196
Detaile																	
CREW Cost Detail																	
		218.0 Days 640.4220 CY/Da	0.0016 Da/CY			2078.88 Cost/Da											
		218.0 Shifts 640.4220 CY/Sh	0.0016 Sh/CY			2078.88 Cost/Sh											
		1744.0 Hours 80.0528 CY/Hr	0.0125 Hr/CY			259.86 Cost/Hr											
	2.0 LWSLOP	Equipment Operator	3,488.00	HR	U	18.86										19	65,784
			UCC to Activity:		U	0.47										0	65,784
	2.0 REXC330	Excavator CAT 325B	3,488.00	HR	U					82.50						83	287,760
			UCC to Activity:		U					2.06						2	287,760
	1.0 LWSLAB	Site Laborer	1,744.00	HR	U	14.64										15	25,532
			UCC to Activity:		U	0.18										0	25,532
	1.0 RARTDUMP	Articulating Dump Truck	1,744.00	HR	U					42.50						43	74,120
			UCC to Activity:		U					0.53						1	74,120
		Resource List Hour Rate:			U	52.36				207.50						260	
		Resource List UCC to Activity:			U	0.65				2.59						3	453,196
50	2	Exc,Stockpile Soil/EA	71,613	CY		46,914				185,920						3	232,835
Detaile																	
CREW Cost Detail																	
		112.0 Days 639.4018 CY/Da	0.0016 Da/CY			2078.88 Cost/Da											
		112.0 Shifts 639.4018 CY/Sh	0.0016 Sh/CY			2078.88 Cost/Sh											
		896.0 Hours 79.9252 CY/Hr	0.0125 Hr/CY			259.86 Cost/Hr											
	2.0 LWSLOP	Equipment Operator	1,792.00	HR	U	18.86										19	33,797
			UCC to Activity:		U	0.47										0	33,797
	2.0 REXC330	Excavator CAT 325B	1,792.00	HR	U					82.50						83	147,840
			UCC to Activity:		U					2.06						2	147,840
	1.0 LWSLAB	Site Laborer	896.00	HR	U	14.64										15	13,117
			UCC to Activity:		U	0.18										0	13,117
	1.0 RARTDUMP	Articulating Dump Truck	896.00	HR	U					42.50						43	38,080
			UCC to Activity:		U					0.53						1	38,080
		Resource List Hour Rate:			U	52.36				207.50						260	
		Resource List UCC to Activity:			U	0.66				2.60						3	232,835
50	7	Install Cribbing/Walers	6,000.00	SF									246,000			41	246,000
Detaile																	
LIST Cost Detail																	
	1.0 UCRIBWAL	Install Cribbing/Walers	6,000.00	SF	U								41.00			41	246,000
			UCC to Activity:		U								41.00			41	246,000
		Resource List UCC to Activity:			U								41.00			41	246,000
60		Characterization	1.00	LS									679,380			679,380	679,380
Detaile																	
60	1	Rad Analysis Rad Soils	1,014.00	EA									405,600			400	405,600
Detaile																	
LIST Cost Detail																	
	1.0 URADANAL	Rad Analysis	1,014.00	EA	U								400.00			400	405,600
			UCC to Activity:		U								400.00			400	405,600
		Resource List UCC to Activity:			U								400.00			400	405,600
60	2	TCLP Analysis Lead Soil	1,014.00	EA									273,780			270	273,780
Detaile																	
LIST Cost Detail																	
	1.0 UTCLPAN	TCLP Analysis	1,014.00	EA	U								270.00			270	273,780
			UCC to Activity:		U								270.00			270	273,780
		Resource List UCC to Activity:			U								270.00			270	273,780
70		Stabilization	1.00	LS		70,824				796,384	451,621		519,880			1838711	1838711
Detaile																	
70	1	Transport Soil Stockpile	83,645	CY		32,672				53,040						1	85,713
Detaile																	
CREW Cost Detail																	

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Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
	78.0 Days	1072.369 CY/Da		0.0009	Da/CY			1098.88	Cost/Da									
	78.0 Shifts	1072.369 CY/Sh		0.0009	Sh/CY			1098.88	Cost/Sh									
	624.0 Hours	134.0462 CY/Hr		0.0075	Hr/CY			137.36	Cost/Hr									
1.0	LWSLAB	Site Laborer		624.00	HR	U	14.64										15	9,135
			UCC to Activity:			U	0.11										0	9,135
2.0	LWSLOP	Equipment Operator		1,248.00	HR	U	18.86										19	23,537
			UCC to Activity:			U	0.28										0	23,537
2.0	RARTDUMP	Articulating Dump Truck		1,248.00	HR	U					42.50						43	53,040
			UCC to Activity:			U					0.63						1	53,040
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.39				0.63						1	85,713
70	2		Pug Mill Process	83,645	CY						681,409	451,621		420,520			19	1553551
Detaile																		
LIST Cost Detail																		
1.0	UPUGMOB	Mob/Maintain Pug Mill		7.20	LS	U								18,400			18,400	132,480
			UCC to Activity:			U								1.58			2	132,480
1.0	UPUGRENT	Pug Mill Rental		28.80	MO	U					9,660.00						9,660	278,209
			UCC to Activity:			U					3.33						3	278,209
1.0	UPHOSACD	Phosphoric Acid,pH agent		3,010.81	TN	U						150.00					150	451,621
			UCC to Activity:			U						5.40					5	451,621
1.0	UACIDPMP	Acid Pump Rental		28.80	MO	U					10,000						10,000	288,001
			UCC to Activity:			U					3.44						3	288,001
1.0	USTORAGE	Storage of acid,pH red.ag		7.20	LS	U								10,000			10,000	72,000
			UCC to Activity:			U								0.86			1	72,000
1.0	UPWRPUGM	Power for Pug Mill		7.20	LS	U								15,000			15,000	108,000
			UCC to Activity:			U								1.29			1	108,000
1.0	UANCEQUP	Ancillary Equip.for Pug		28.80	MO	U					4,000.00						4,000	115,200
			UCC to Activity:			U					1.38						1	115,200
1.0	ULOADSOL	Load soil into Pug Mill		83,645	CY	U								1.22			1	102,047
			UCC to Activity:			U								1.22			1	102,047
1.0	ULOADPHS	Load Phosphoric in Pug		1,958.40	CY	U								1.53			2	2,996
			UCC to Activity:			U								0.04			0	2,996
1.0	ULODPH	Load pH Reduct in Pug		1,958.40	CY	U								1.53			2	2,996
			UCC to Activity:			U								0.04			0	2,996
			Resource List UCC to Activity:			U					8.15	5.40		5.03			19	1553551
70	3		Confirmation Testing	368.00	EA									99,360			270	99,360
Detaile																		
LIST Cost Detail																		
1.0	UTCLPAN	TCLP Analysis		368.00	EA	U								270.00			270	99,360
			UCC to Activity:			U								270.00			270	99,360
			Resource List UCC to Activity:			U								270.00			270	99,360
70	4		Transport to Stockpile	92,010	CY		38,151				61,934						1	100,087
Detaile																		
CREW Cost Detail																		
	91.1 Days	1010.203 CY/Da		0.0010	Da/CY			1098.88	Cost/Da									
	91.1 Shifts	1010.203 CY/Sh		0.0010	Sh/CY			1098.88	Cost/Sh									
	728.6 Hours	126.2754 CY/Hr		0.0079	Hr/CY			137.36	Cost/Hr									
1.0	LWSLAB	Site Laborer		728.65	HR	U	14.64										15	10,667
			UCC to Activity:			U	0.12										0	10,667
2.0	LWSLOP	Equipment Operator		1,457.29	HR	U	18.86										19	27,485
			UCC to Activity:			U	0.30										0	27,485
2.0	RARTDUMP	Articulating Dump Truck		1,457.29	HR	U					42.50						43	61,935
			UCC to Activity:			U					0.67						1	61,935
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.41				0.67						1	100,087
80			Confirmatory Sampling	1.00	LS									490,100			490,100	490,100
Detaile																		
80	1		Confirmatory Sampling	845.00	EA									490,100			580	490,100
Detaile																		
LIST Cost Detail																		
1.0	URADANAL	Rad Analysis		845.00	EA	U								400.00			400	338,000
			UCC to Activity:			U								400.00			400	338,000
1.0	UMETALAN	Metals Analysis		845.00	EA	U								180.00			180	152,100
			UCC to Activity:			U								180.00			180	152,100
			Resource List UCC to Activity:			U								580.00			580	490,100

Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
90			Additional Excavation	1.00	LS		7,121.62				28,222						35,344	35,344
Detaile																		
90	1		Exc,Stockpile Soil/DA	6,981.00	CY		4,608.34				18,262						3	22,871
Detaile																		
CREW Cost Detail																		
	11.0 Days		634.5455 CY/Da	0.0016 Da/CY			2078.88 Cost/Da											
	11.0 Shifts		634.5455 CY/Sh	0.0016 Sh/CY			2078.88 Cost/Sh											
	88.0 Hours		79.3182 CY/Hr	0.0126 Hr/CY			259.86 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	176.03	HR	U	18.86										19	3,320
				UCC to Activity:		U	0.48										0	3,320
	2.0	REXC330	Excavator CAT 325B	176.03	HR	U					82.50						83	14,522
				UCC to Activity:		U					2.08						2	14,522
	1.0	LWSLAB	Site Laborer	88.01	HR	U	14.64										15	1,289
				UCC to Activity:		U	0.18										0	1,289
	1.0	RARTDUMP	Articulating Dump Truck	88.01	HR	U					42.50						43	3,741
				UCC to Activity:		U					0.54						1	3,741
			Resource List Hour Rate:			U	52.36				207.50						260	
			Resource List UCC to Activity:			U	0.66				2.62						3	22,871
90	2		Exc,Stockpile Soil/EA	3,581.00	CY		2,513.28				9,960.00						3	12,473
Detaile																		
CREW Cost Detail																		
	6.0 Days		596.8333 CY/Da	0.0017 Da/CY			2078.88 Cost/Da											
	6.0 Shifts		596.8333 CY/Sh	0.0017 Sh/CY			2078.88 Cost/Sh											
	48.0 Hours		74.6042 CY/Hr	0.0134 Hr/CY			259.86 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	96.00	HR	U	18.86										19	1,811
				UCC to Activity:		U	0.51										1	1,811
	1.0	LWSLAB	Site Laborer	48.00	HR	U	14.64										15	703
				UCC to Activity:		U	0.20										0	703
	2.0	REXC330	Excavator CAT 325B	96.00	HR	U					82.50						83	7,920
				UCC to Activity:		U					2.21						2	7,920
	1.0	RARTDUMP	Articulating Dump Truck	48.00	HR	U					42.50						43	2,040
				UCC to Activity:		U					0.57						1	2,040
			Resource List Hour Rate:			U	52.36				207.50						260	
			Resource List UCC to Activity:			U	0.70				2.78						3	12,473
100			Confirmatory Sampling AE	1.00	LS									24,360			24,360	24,360
Detaile																		
100	1		Confirmatory Sampling AE	42.00	EA									24,360			580	24,360
Detaile																		
LIST Cost Detail																		
	1.0	URADANAL	Rad Analysis	42.00	EA	U								400.00			400	16,800
				UCC to Activity:		U								400.00			400	16,800
	1.0	UMETALAN	Metals Analysis	42.00	EA	U								180.00			180	7,560
				UCC to Activity:		U								180.00			180	7,560
			Resource List UCC to Activity:			U								580.00			580	24,360
110			Onsite Disposal Soil DA	1.00	LS		22,200				53,260						75,461	75,461
Detaile																		
110	1		Transport from Stockpile	32,400	CY		13,404				21,760						1	35,164
Detaile																		
CREW Cost Detail																		
	32.0 Days		1012.500 CY/Da	0.0010 Da/CY			1098.88 Cost/Da											
	32.0 Shifts		1012.500 CY/Sh	0.0010 Sh/CY			1098.88 Cost/Sh											
	256.0 Hours		126.5625 CY/Hr	0.0079 Hr/CY			137.36 Cost/Hr											
	1.0	LWSLAB	Site Laborer	256.00	HR	U	14.64										15	3,748
				UCC to Activity:		U	0.12										0	3,748
	2.0	LWSLOP	Equipment Operator	512.00	HR	U	18.86										19	9,656
				UCC to Activity:		U	0.30										0	9,656
	2.0	RARTDUMP	Articulating Dump Truck	512.00	HR	U					42.50						43	21,760
				UCC to Activity:		U					0.67						1	21,760
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.41				0.67						1	35,164

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Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
110	2		Place & Compact Soil	32,400	CY		8,796.48				31,500						1	40,296
Detaile																		
CREW Cost Detail																		
	21.0 Days		1542.857 CY/Da	0.0006 Da/CY			1918.88 Cost/Da											
	21.0 Shifts		1542.857 CY/Sh	0.0006 Sh/CY			1918.88 Cost/Sh											
	168.0 Hours		192.8571 CY/Hr	0.0052 Hr/CY			239.86 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	336.00	HR	U	18.86										19	6,337
			UCC to Activity:			U	0.20										0	6,337
	1.0	LWSLAB	Site Laborer	168.00	HR	U	14.64										15	2,460
			UCC to Activity:			U	0.08										0	2,460
	2.0	RCOMPACT	Compactor CAT CS323C	336.00	HR	U					93.75						94	31,500
			UCC to Activity:			U					0.97						1	31,500
			Resource List Hour Rate:			U	52.36				187.50						240	
			Resource List UCC to Activity:			U	0.27				0.97						1	40,296
120			Composite Cover DA	1.00	LS		8,981.19				17,706	180,937		39,998			247,625	247,625
Detaile																		
120	1		18" Compacted Clay	4,269.00	CY		1,882.31				5,706.98	34,152					10	41,741
Detaile																		
LIST Cost Detail																		
	1.0	MCLAY	Clay	4,269.00	CY	U						8.00					8	34,152
			UCC to Activity:			U						8.00					8	34,152
			Resource List UCC to Activity:			U						8.00					8	34,152
CREW Cost Detail																		
	4.5 Days		950.0000 CY/Da	0.0011 Da/CY			1688.88 Cost/Da											
	4.5 Shifts		950.0000 CY/Sh	0.0011 Sh/CY			1688.88 Cost/Sh											
	35.9 Hours		118.7500 CY/Hr	0.0084 Hr/CY			211.11 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	71.90	HR	U	18.86										19	1,356
			UCC to Activity:			U	0.32										0	1,356
	1.0	RDOZERD8	CAT D-8 Dozer	35.95	HR	U					65.00						65	2,337
			UCC to Activity:			U					0.55						1	2,337
	1.0	LWSLAB	Site Laborer	35.95	HR	U	14.64										15	526
			UCC to Activity:			U	0.12										0	526
	1.0	RCOMPACT	Compactor CAT CS323C	35.95	HR	U					93.75						94	3,370
			UCC to Activity:			U					0.79						1	3,370
			Resource List Hour Rate:			U	52.36				158.75						211	
			Resource List UCC to Activity:			U	0.44				1.34						2	7,589
120	2		12oz Non-Woven Geotextile	83,888	SF		1,405.44					17,616					0	19,022
Detaile																		
LIST Cost Detail																		
	1.0	MGEOTEXT	Geotextile Fabric	83,888	SF	U						0.21					0	17,616
			UCC to Activity:			U						0.21					0	17,616
			Resource List UCC to Activity:			U						0.21					0	17,616
CREW Cost Detail																		
	6.0 Days		13981.33 SF/Da	0.0001 Da/SF			234.24 Cost/Da											
	6.0 Shifts		13981.33 SF/Sh	0.0001 Sh/SF			234.24 Cost/Sh											
	48.0 Hours		1747.667 SF/Hr	0.0006 Hr/SF			29.28 Cost/Hr											
	2.0	LWSLAB	Site Laborer	96.00	HR	U	14.64										15	1,405
			UCC to Activity:			U	0.02										0	1,405
			Resource List Hour Rate:			U	29.28										29	
			Resource List UCC to Activity:			U	0.02										0	1,405
120	3		40mil PVC Geomembrane	83,888	SF									35,232			0	35,233
Detaile																		
LIST Cost Detail																		
	1.0	U40MILNR	40 mil Liner	83,888	SF	U								0.42			0	35,233
			UCC to Activity:			U								0.42			0	35,233
			Resource List UCC to Activity:			U								0.42			0	35,233

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Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
120	4	Drainage Net	83,888	SF		936.96					8,388.80					0	9,326
Detaile																	
LIST Cost Detail																	
	1.0 MDRAINET	Drainage Net	83,888	SF	U						0.10					0	8,389
		UCC to Activity:			U						0.10					0	8,389
		Resource List UCC to Activity:			U						0.10					0	8,389
CREW Cost Detail																	
	4.0 Days	20972.00 SF/Da	0.0000 Da/SF			234.24 Cost/Da											
	4.0 Shifts	20972.00 SF/Sh	0.0000 Sh/SF			234.24 Cost/Sh											
	32.0 Hours	2621.500 SF/Hr	0.0004 Hr/SF			29.28 Cost/Hr											
	2.0 LWSLAB	Site Laborer	64.00	HR	U	14.64										15	937
		UCC to Activity:			U	0.01										0	937
		Resource List Hour Rate:			U	29.28										29	
		Resource List UCC to Activity:			U	0.01										0	937
120	5	6oz Non-Woven Geotextile	83,888	SF		1,405.44					17,616					0	19,022
Detaile																	
LIST Cost Detail																	
	1.0 MGEOTEXT	Geotextile Fabric	83,888	SF	U						0.21					0	17,616
		UCC to Activity:			U						0.21					0	17,616
		Resource List UCC to Activity:			U						0.21					0	17,616
CREW Cost Detail																	
	6.0 Days	13981.33 SF/Da	0.0001 Da/SF			234.24 Cost/Da											
	6.0 Shifts	13981.33 SF/Sh	0.0001 Sh/SF			234.24 Cost/Sh											
	48.0 Hours	1747.667 SF/Hr	0.0006 Hr/SF			29.28 Cost/Hr											
	2.0 LWSLAB	Site Laborer	96.00	HR	U	14.64										15	1,405
		UCC to Activity:			U	0.02										0	1,405
		Resource List Hour Rate:			U	29.28										29	
		Resource List UCC to Activity:			U	0.02										0	1,405
120	6	Barrier Protection Soil	6,214.00	CY		2,513.28				9,000.00	78,300					14	89,813
Detaile																	
LIST Cost Detail																	
	1.0 MFILLMTL	Fill Material	8,700.00	CY	U						9.00					9	78,300
		UCC to Activity:			U						12.60					13	78,300
		Resource List UCC to Activity:			U						12.60					13	78,300
CREW Cost Detail																	
	6.0 Days	1035.667 CY/Da	0.0010 Da/CY			1918.88 Cost/Da											
	6.0 Shifts	1035.667 CY/Sh	0.0010 Sh/CY			1918.88 Cost/Sh											
	48.0 Hours	129.4583 CY/Hr	0.0077 Hr/CY			239.86 Cost/Hr											
	2.0 LWSLOP	Equipment Operator	96.00	HR	U	18.86										19	1,811
		UCC to Activity:			U	0.29										0	1,811
	1.0 LWSLAB	Site Laborer	48.00	HR	U	14.64										15	703
		UCC to Activity:			U	0.11										0	703
	2.0 RCOMPACT	Compactor CAT CS323C	96.00	HR	U					93.75						94	9,000
		UCC to Activity:			U					1.45						1	9,000
		Resource List Hour Rate:			U	52.36				187.50						240	
		Resource List UCC to Activity:			U	0.40				1.45						2	11,513
120	7	Topsoil	1,554.00	CY		837.76				3,000.00	24,864					18	28,702
Detaile																	
LIST Cost Detail																	
	1.0 MTOPSOIL	Topsoil	1,554.00	CY	U						16.00					16	24,864
		UCC to Activity:			U						16.00					16	24,864
		Resource List UCC to Activity:			U						16.00					16	24,864
CREW Cost Detail																	
	2.0 Days	777.0000 CY/Da	0.0013 Da/CY			1918.88 Cost/Da											
	2.0 Shifts	777.0000 CY/Sh	0.0013 Sh/CY			1918.88 Cost/Sh											
	16.0 Hours	97.1250 CY/Hr	0.0103 Hr/CY			239.86 Cost/Hr											

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Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
	2.0	LWSLOP	Equipment Operator	32.00	HR	U	18.86										19	604
			UCC to Activity:			U	0.39										0	604
	1.0	LWSLAB	Site Laborer	16.00	HR	U	14.64										15	234
			UCC to Activity:			U	0.15										0	234
	2.0	RCOMPACT	Compactor CAT CS323C	32.00	HR	U					93.75						94	3,000
			UCC to Activity:			U					1.93						2	3,000
			Resource List Hour Rate:			U	52.36				187.50						240	
			Resource List UCC to Activity:			U	0.54				1.93						2	3,838
120	8		Vegetative Cover	85,788	SF									4,766.00			0	4,766
Detaile																		
LIST Cost Detail																		
	1.0	USEEDING	Seeding	9,532.00	SY	U								0.50			1	4,766
			UCC to Activity:			U								0.06			0	4,766
			Resource List UCC to Activity:			U								0.06			0	4,766
130			T & D Offsite	1.00	LS		114,751				186,285			41619022		41920059	41920059	41920059
Detaile																		
130	1		Transport from Stockpile	274,508	CY		114,751				186,285						1	301,037
Detaile																		
CREW Cost Detail																		
	273.9 Days		1002.042 CY/Da		0.0010 Da/CY		1098.88 Cost/Da											
	273.9 Shifts		1002.042 CY/Sh		0.0010 Sh/CY		1098.88 Cost/Sh											
	2191.6 Hours		125.2553 CY/Hr		0.0080 Hr/CY		137.36 Cost/Hr											
	1.0	LWSLAB	Site Laborer	2,191.59	HR	U	14.64										15	32,085
			UCC to Activity:			U	0.12										0	32,085
	2.0	LWSLOP	Equipment Operator	4,383.18	HR	U	18.86										19	82,667
			UCC to Activity:			U	0.30										0	82,667
	2.0	RARTDUMP	Articulating Dump Truck	4,383.18	HR	U					42.50						43	186,285
			UCC to Activity:			U					0.68						1	186,285
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.42				0.68						1	301,037
130	2		T & D Subtitle C (LLRW)	1,250.00	CY									311,875			250	311,875
Detaile																		
LIST Cost Detail																		
	Note:		1cy = 1.2tons															
	1.0	UDISPEUT	Disposal Subtitle C(LLRW)	1,250.00	CY	U								149.50			150	186,875
			UCC to Activity:			U								149.50			150	186,875
	1.0	UTRANSPT	Transport by Rail	1,250.00	CY	U								100.00			100	125,000
			UCC to Activity:			U								100.00			100	125,000
			Resource List UCC to Activity:			U								249.50			250	311,875
130	3		T & D Soils Envirosafe LD	240,585	CY									41307147			172	41307147
Detaile																		
LIST Cost Detail																		
	Note:		1cy = 1.2tons															
	1.0	UDISENSF	Disposal Subtitle C(LARW)	240,858	CY	U								71.50			72	17221347
			UCC to Activity:			U								71.58			72	17221347
	1.0	UTRANSPT	Transport by Rail	240,858	CY	U								100.00			100	24085800
			UCC to Activity:			U								100.11			100	24085800
			Resource List UCC to Activity:			U								171.69			172	41307147
130	4		T & D Soils Subtitle D LF	1.00	CY									0.00			0	0
Detaile																		
LIST Cost Detail																		
	Note:		1 cy = 1.2 tons															
	1.0	UT&DVOC	T & D VOC Soils	0.00	TN	U								45.00			45	0
			UCC to Activity:			U								0.00			0	0
			Resource List UCC to Activity:			U								0.00			0	0
140			Offsite Disposal VOC,SVOC	1.00	LS		58.59				95.12			31,725		31,879	31,879	31,879
Detaile																		

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Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
140	1		Characterization Sampling	10.00	EA									6,000.00			600	6,000
Detaile																		
LIST Cost Detail																		
	1.0	UVOCANAL	VOC Analysis	10.00	EA	U								225.00			225	2,250
				UCC to Activity:		U								225.00			225	2,250
	1.0	USVOCANL	SVOC Analysis	10.00	EA	U								375.00			375	3,750
				UCC to Activity:		U								375.00			375	3,750
			Resource List UCC to Activity:			U								600.00			600	6,000
140	2		T & D Soils	150.00	TN									25,725			172	25,725
Detaile																		
LIST Cost Detail																		
	1.0	UT&DSUBD	T & D Subtitle D Landfill	150.00	TN	U								171.50			172	25,725
				UCC to Activity:		U								171.50			172	25,725
			Resource List UCC to Activity:			U								171.50			172	25,725
140	3		Transport to Stockpile	150.00	CY		58.59				95.12						1	154
Detaile																		
CREW Cost Detail																		
	0.1 Days		1072.369 CY/Da	0.0009 Da/CY			1098.88 Cost/Da											
	0.1 Shifts		1072.369 CY/Sh	0.0009 Sh/CY			1098.88 Cost/Sh											
	1.1 Hours		134.0462 CY/Hr	0.0075 Hr/CY			137.36 Cost/Hr											
	1.0	LWSLAB	Site Laborer	1.12	HR	U	14.64										15	16
				UCC to Activity:		U	0.11										0	16
	2.0	LWSLOP	Equipment Operator	2.24	HR	U	18.86										19	42
				UCC to Activity:		U	0.28										0	42
	2.0	RARTDUMP	Articulating Dump Truck	2.24	HR	U					42.50						43	95
				UCC to Activity:		U					0.63						1	95
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.39				0.63						1	154
150			*GW Monitoring Wells*	10.00	EA									25,000			2,500	25,000
Detaile																		
150	1		GW Monitoring Wells	10.00	EA									25,000			2,500	25,000
Detaile																		
LIST Cost Detail																		
	1.0	UGWELLS	GW Monitoring Wells	10.00	EA	U								2,500.00			2,500	25,000
				UCC to Activity:		U								2,500.00			2,500	25,000
			Resource List UCC to Activity:			U								2,500.00			2,500	25,000
160			Site Restoration EA	1.00	LS		127,724				457,379	2195685		9,502.50			2790291	2790291
Detaile																		
160	1		Fill Material	243,965	CY							2195685					9	2195685
Detaile																		
LIST Cost Detail																		
	1.0	MFILLMTL	Fill Material	243,965	CY	U						9.00					9	2195685
				UCC to Activity:		U						9.00					9	2195685
			Resource List UCC to Activity:			U						9.00					9	2195685
160	2		Spread,Compact,Grade Fill	243,965	CY		127,724				457,379						2	585,104
Detaile																		
CREW Cost Detail																		
	304.9 Days		800.0964 CY/Da	0.0012 Da/CY			1918.88 Cost/Da											
	304.9 Shifts		800.0964 CY/Sh	0.0012 Sh/CY			1918.88 Cost/Sh											
	2439.4 Hours		100.0121 CY/Hr	0.0100 Hr/CY			239.86 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	4,878.71	HR	U	18.86										19	92,013
				UCC to Activity:		U	0.38										0	92,013
	1.0	LWSLAB	Site Laborer	2,439.36	HR	U	14.64										15	35,712
				UCC to Activity:		U	0.15										0	35,712
	2.0	RCOMPACT	Compactor CAT CS323C	4,878.71	HR	U					93.75						94	457,379
				UCC to Activity:		U					1.87						2	457,379
			Resource List Hour Rate:			U	52.36				187.50						240	
			Resource List UCC to Activity:			U	0.52				1.87						2	585,104

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Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
160	3	Seed Area	10.50	AC									9,502.50			905	9,503
Detaile																	
LIST Cost Detail																	
	1.0 USEED	Seeding	10.50	AC	U								905.00			905	9,503
		UCC to Activity:			U								905.00			905	9,503
		Resource List UCC to Activity:			U								905.00			905	9,503
170		Demobilization	1.00	LS		5,360.00							15,000			20,360	20,360
Detaile																	
LIST Cost Detail																	
	1.0 UDEMOBTR	Demob Trailers	6.00	EA	U								500.00			500	3,000
		UCC to Activity:			U								3,000.00			3,000	3,000
	1.0 UDEMOBEQ	Demob Equipment	10.00	EA	U								300.00			300	3,000
		UCC to Activity:			U								3,000.00			3,000	3,000
	1.0 UDISMUTL	Dismantle Utilities	1.00	LS	U								6,000.00			6,000	6,000
		UCC to Activity:			U								6,000.00			6,000	6,000
	1.0 UDISPOSL	Disposal of Debris	1.00	LS	U								3,000.00			3,000	3,000
		UCC to Activity:			U								3,000.00			3,000	3,000
		Resource List UCC to Activity:			U								15,000			15,000	15,000
CREW Cost Detail																	
	10.0 Days	0.1000 LS/Da	10.0000 Da/LS		536.00 Cost/Da												
	10.0 Shifts	0.1000 LS/Sh	10.0000 Sh/LS		536.00 Cost/Sh												
	80.0 Hours	0.0125 LS/Hr	80.0000 Hr/LS		67.00 Cost/Hr												
	2.0 LWSLOP	Equipment Operator	160.00	HR	U	18.86										19	3,018
		UCC to Activity:			U	3,017.60										3,018	3,018
	2.0 LWSLAB	Site Laborer	160.00	HR	U	14.64										15	2,342
		UCC to Activity:			U	2,342.40										2,342	2,342
		Resource List Hour Rate:			U	67.00										67	
		Resource List UCC to Activity:			U	5,360.00										5,360	5,360
190		Indirect Construct Cost	1.00	LS									7135848			7135848	7135848
Detaile																	
190	1	Permit & Legal (5%)	1.00	LS									396,436			396,436	396,436
Detaile																	
LIST Cost Detail																	
	1.0 UPERMLGL	Permit & Legal 5%	1.00	LS	U								396,436			396,436	396,436
		UCC to Activity:			U								396,436			396,436	396,436
		Resource List UCC to Activity:			U								396,436			396,436	396,436
190	2	Health & Safety (10%)	1.00	LS									792,872			792,872	792,872
Detaile																	
LIST Cost Detail																	
	1.0 UH&S	Health & Safety 10%	1.00	LS	U								792,872			792,872	792,872
		UCC to Activity:			U								792,872			792,872	792,872
		Resource List UCC to Activity:			U								792,872			792,872	792,872
190	3	Construct Management(10%)	1.00	LS									792,872			792,872	792,872
Detaile																	
LIST Cost Detail																	
	1.0 UCONSTMG	Construct Manage 10%	1.00	LS	U								792,872			792,872	792,872
		UCC to Activity:			U								792,872			792,872	792,872
		Resource List UCC to Activity:			U								792,872			792,872	792,872
190	4	QA & Oversight (10%)	1.00	LS									792,872			792,872	792,872
Detaile																	
LIST Cost Detail																	
	1.0 UQAOVEST	QA & Oversight 10%	1.00	LS	U								792,872			792,872	792,872
		UCC to Activity:			U								792,872			792,872	792,872
		Resource List UCC to Activity:			U								792,872			792,872	792,872
190	5	Bid & Scope Conting.(10%)	1.00	LS									792,872			792,872	792,872
Detaile																	
LIST Cost Detail																	
	1.0 UBIDSCPE	Bid & Scope Conting. 10%	1.00	LS	U								792,872			792,872	792,872
		UCC to Activity:			U								792,872			792,872	792,872
		Resource List UCC to Activity:			U								792,872			792,872	792,872

Code	Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
190 6	Cert.Consruct.Report (5%)	1.00	LS									396,436			396,436	396,436
Detaile																
LIST Cost Detail																
1.0 UCERTREP	Cert. Constrct. Report 5%	1.00	LS	U								396,436			396,436	396,436
	UCC to Activity:			U								396,436			396,436	396,436
	Resource List UCC to Activity:			U								396,436			396,436	396,436
190 7	Surveying/GPS (10%)	1.00	LS									792,872			792,872	792,872
Detaile																
LIST Cost Detail																
1.0 USURVEYG	Survey/GPS 10%	1.00	LS	U								792,872			792,872	792,872
	UCC to Activity:			U								792,872			792,872	792,872
	Resource List UCC to Activity:			U								792,872			792,872	792,872
190 8	Office Proj. Mgmt (10%)	1.00	LS									792,872			792,872	792,872
Detaile																
LIST Cost Detail																
1.0 UPROJMGM	Office Project Manage 10%	1.00	LS	U								792,872			792,872	792,872
	UCC to Activity:			U								792,872			792,872	792,872
	Resource List UCC to Activity:			U								792,872			792,872	792,872
190 9	Miscellaneous (ODCs) (5%)	1.00	LS									396,436			396,436	396,436
Detaile																
LIST Cost Detail																
1.0 UMISC	Miscellaneous ODC's 5%	1.00	LS	U								396,436			396,436	396,436
	UCC to Activity:			U								396,436			396,436	396,436
	Resource List UCC to Activity:			U								396,436			396,436	396,436
190 10	Health Physics Support-5%	1.00	LS									396,436			396,436	396,436
Detaile																
LIST Cost Detail																
1.0 UHEALPHY	Health Physics Sup. 5%	1.00	LS	U								396,436			396,436	396,436
	UCC to Activity:			U								396,436			396,436	396,436
	Resource List UCC to Activity:			U								396,436			396,436	396,436
190 11	Gen.Contingency (10%)	1.00	LS									792,872			792,872	792,872
Detaile																
LIST Cost Detail																
1.0 UGENCONT	General Contingency 10%	1.00	LS	U								792,872			792,872	792,872
	UCC to Activity:			U								792,872			792,872	792,872
	Resource List UCC to Activity:			U								792,872			792,872	792,872
200	Post Closure Activity(PW)	1.00	LS									1266376			1266376	1266376
Detaile																
200 1	Maintain Cover DA	1.00	LS									390,500			390,500	390,500
Detaile																
LIST Cost Detail																
1.0 UO&MCAP	O & M of Cap	2.41	LS	U								162,000			162,000	390,500
	UCC to Activity:			U								390,500			390,500	390,500
	Resource List UCC to Activity:			U								390,500			390,500	390,500
200 2	Quarterly Monitoring Well	4.00	EA									805,776			201,444	805,776
Detaile																
LIST Cost Detail																
1.0 UGWMONOM	GW Monitoring sampling	1.62	LS	U								497,700			497,700	805,776
	UCC to Activity:			U								201,444			201,444	805,776
	Resource List UCC to Activity:			U								201,444			201,444	805,776
200 3	CERCLA Reviews	1.00	LS									70,100			70,100	70,100
Detaile																
LIST Cost Detail																
1.0 USUMREPT	Summary Report PresentWth	1.00	LS	U								70,100			70,100	70,100
	UCC to Activity:			U								70,100			70,100	70,100
	Resource List UCC to Activity:			U								70,100			70,100	70,100

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ALTERNATIVE 2B, URBAN RESIDENT

Job Description: Colonie 2B Urban Resident

Proposal Date:
Time:

From: ROY F. WESTON, INC.

Bid Item Number	Bid Item Description	Quantity	UM	Unit Price	Total Price
10	Mobilization & Site Preparation	1.0000	LS	0.00	**0.00**
20	Buried Drums	25.0000	EA	566.04	**14,151.00**
30	Divert Tributary	1.0000	LS	121,596.00	**121,596.00**
40	Dewater Excavation	1.0000	LS	164,428.78	**164,428.78**
50	Excavation	1.0000	LS	435,178.08	**435,178.08**
60	Characterization of Stockpiled Soils	1.0000	LS	189,610.00	**189,610.00**
70	Stabilization of Lead Soils	1.0000	LS	513,043.06	**513,043.06**
80	Confirmatory Sampling	1.0000	LS	136,880.00	**136,880.00**
90	Additional Excavation	1.0000	LS	9,354.96	**9,354.96**
100	Confirmatory Sampling AE	1.0000	LS	6,960.00	**6,960.00**
110	Transport & Dispose Offsite	1.0000	LS	13,316,028.38	**13,316,028.38**
120	Offsite Disposal VOC,SVOC	1.0000	LS	31,886.80	**31,886.80**
125	Groundwater Monitoring Wells	10.0000	EA	2,500.00	**25,000.00**
130	Site Restoration	1.0000	LS	787,029.30	**787,029.30**
140	Demobilize	1.0000	LS	20,360.00	**20,360.00**
	Direct Construction Cost			Subtotal	**15,771,506.36**
				Running Total	**15,771,506.36**
150	Indirect Construction Cost	1.0000	LS	2,209,932.01	**2,209,932.01**
	Indirect Construction Cost			Subtotal	**2,209,932.01**
				Running Total	**17,981,438.37**
200	Post Closure Activites (Present Worth)	1.0000	LS	875,876.30	**875,876.30**
				GRAND TOTAL	**18,857,314.67**

Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
10 Detaile			Mobilization & Site Prep	1.00	LS													
20 Detaile			Buried Drums	25.00	EA		536.00				240.00	4,625.00		8,750.00			566	14,151
20 Detaile	1		Repackage Drums	25.00	EA		536.00				240.00	4,625.00					216	5,401
LIST Cost Detail																		
	1.0	MOVERPAC	Overpac Drums	25.00	EA	U						185.00					185	4,625
			UCC to Activity:			U						185.00					185	4,625
			Resource List UCC to Activity:			U						185.00					185	4,625
CREW Cost Detail																		
	2.0 Days		12.5000 EA/Da	0.0800 Da/EA			388.00 Cost/Da											
	2.0 Shifts		12.5000 EA/Sh	0.0800 Sh/EA			388.00 Cost/Sh											
	16.0 Hours		1.5625 EA/Hr	0.6400 Hr/EA			48.50 Cost/Hr											
	1.0	LWSLAB	Site Laborer	16.00	HR	U	14.64										15	234
			UCC to Activity:			U	9.37										9	234
	1.0	LWSLOP	Equipment Operator	16.00	HR	U	18.86										19	302
			UCC to Activity:			U	12.07										12	302
	1.0	RBACKHOE	Backhoe JD 710	16.00	HR	U					15.00						15	240
			UCC to Activity:			U					9.60						10	240
			Resource List Hour Rate:			U	33.50				15.00						49	
			Resource List UCC to Activity:			U	21.44				9.60						31	776
20 Detaile	2		Offsite Transport&Dispose	25.00	EA									8,750.00			350	8,750
LIST Cost Detail																		
	1.0	UT&DRUM	T&D Drums	25.00	EA	U								350.00			350	8,750
			UCC to Activity:			U								350.00			350	8,750
			Resource List UCC to Activity:			U								350.00			350	8,750
30 Detaile			Divert Tributary	1.00	LS		4,556.00				16,440	58,600		42,000			121,596	121,596
30 Detaile	1		Divert Pipeline	1,000.00	LF		4,020.00				16,200	58,000		42,000			120	120,220
LIST Cost Detail																		
	1.0	UHORZBOR	Horizontal Boring	100.00	LF	U								420.00			420	42,000
			UCC to Activity:			U								42.00			42	42,000
	1.0	M4'DPIPE	4'dia. pipe	1,000.00	LF	U						58.00					58	58,000
			UCC to Activity:			U						58.00					58	58,000
			Resource List UCC to Activity:			U						58.00		42.00			100	100,000
CREW Cost Detail																		
	Note:		Excavate & Backfill for new pipe. Horizontal Bore under Railroad Tracks.															
	15.0 Days		66.6667 LF/Da	0.0150 Da/LF			1348.00 Cost/Da											
	15.0 Shifts		66.6667 LF/Sh	0.0150 Sh/LF			1348.00 Cost/Sh											
	120.0 Hours		8.3333 LF/Hr	0.1200 Hr/LF			168.50 Cost/Hr											
	1.0	LWSLAB	Site Laborer	120.00	HR	U	14.64										15	1,757
			UCC to Activity:			U	1.76										2	1,757
	1.0	LWSLOP	Equipment Operator	120.00	HR	U	18.86										19	2,263
			UCC to Activity:			U	2.26										2	2,263
	1.0	RBACKHOE	Backhoe JD 710	120.00	HR	U					15.00						15	1,800
			UCC to Activity:			U					1.80						2	1,800
	1.0	RCRANE	Crane W/Operator	120.00	HR	U					120.00						120	14,400
			UCC to Activity:			U					14.40						14	14,400
			Resource List Hour Rate:			U	33.50				135.00						169	
			Resource List UCC to Activity:			U	4.02				16.20						20	20,220
30 Detaile	2		Plug & Abandon Ex.Culvert	2.00	EA		536.00				240.00	600.00					688	1,376
LIST Cost Detail																		
	1.0	MPLUGS	48" Plugs	2.00	EA	U						300.00					300	600
			UCC to Activity:			U						300.00					300	600
			Resource List UCC to Activity:			U						300.00					300	600
CREW Cost Detail																		

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Code		Description	Quantity UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
	2.0 Days	1.0000 EA/Da	1.0000 Da/EA			388.00 Cost/Da										
	2.0 Shifts	1.0000 EA/Sh	1.0000 Sh/EA			388.00 Cost/Sh										
	16.0 Hours	0.1250 EA/Hr	8.0000 Hr/EA			48.50 Cost/Hr										
1.0	LWSLAB	Site Laborer	16.00 HR	U	14.64										15	234
			UCC to Activity:	U	117.12										117	234
1.0	LWSLOP	Equipment Operator	16.00 HR	U	18.86										19	302
			UCC to Activity:	U	150.88										151	302
1.0	RBACKHOE	Backhoe JD 710	16.00 HR	U					15.00						15	240
			UCC to Activity:	U					120.00						120	240
		Resource List Hour Rate:		U	33.50				15.00						49	
		Resource List UCC to Activity:		U	268.00				120.00						388	776
40		Dewater Excavation	1.00 LS		138,320							26,108			164,429	164,429
Detaile																
40	1	Operator 24hr/day	19.00 WK		95,760										5,040	95,760
Detaile																
LIST Cost Detail																
	Note:	Operate 24 hours/day														
	399.0 Days	0.0476 WK/Da	21.0000 Da/WK			240.00 Cost/Da										
	399.0 Shifts	0.0476 WK/Sh	21.0000 Sh/WK			240.00 Cost/Sh										
	3192.0 Hours	0.0060 WK/Hr	168.0000 Hr/WK			30.00 Cost/Hr										
1.0	LDWOPER	Dewatering Operator	3,192.00 HR	U	30.00										30	95,760
			UCC to Activity:	U	5,040.00										5,040	95,760
		Weighted Average Hour Rate:		U	30.00										30	
		Resource List UCC to Activity:		U	5,040.00										5,040	95,760
40	2	Change Carbon	4.50 MO									13,500			3,000	13,500
Detaile																
LIST Cost Detail																
	Note:	Change carbon monthly														
1.0	UCARCHNG	Carbon Changeouts	4.50 EA	U								3,000.00			3,000	13,500
			UCC to Activity:	U								3,000.00			3,000	13,500
		Resource List UCC to Activity:		U								3,000.00			3,000	13,500
40	3	Night Shift Supervisor	19.00 WK		42,560										2,240	42,560
Detaile																
LIST Cost Detail																
	Note:	Night shift supervisor 8 hr/day														
	133.0 Days	0.1429 WK/Da	7.0000 Da/WK			320.00 Cost/Da										
	133.0 Shifts	0.1429 WK/Sh	7.0000 Sh/WK			320.00 Cost/Sh										
	1064.0 Hours	0.0179 WK/Hr	56.0000 Hr/WK			40.00 Cost/Hr										
1.0	LDWNOPER	Dewatering Operator Nite	1,064.00 HR	U	40.00										40	42,560
			UCC to Activity:	U	2,240.00										2,240	42,560
		Weighted Average Hour Rate:		U	40.00										40	
		Resource List UCC to Activity:		U	2,240.00										2,240	42,560
40	4	Electricity for Pumps	4.50 MO									10,178			2,262	10,179
Detaile																
LIST Cost Detail																
1.0	UELECTKW	Electricity	3,024.00 HR	U								3.37			3	10,179
			UCC to Activity:	U								2,261.95			2,262	10,179
		Resource List UCC to Activity:		U								2,261.95			2,262	10,179
40	5	Misc. Electric Charge	4.50 MO									1,080.00			240	1,080
Detaile																
LIST Cost Detail																
1.0	UMISCELE	Misc. Electric Charge	4.50 MO	U								240.00			240	1,080
			UCC to Activity:	U								240.00			240	1,080
		Resource List UCC to Activity:		U								240.00			240	1,080
40	6	Water Treatment Analysis	4.50 EA									1,350.00			300	1,350
Detaile																
LIST Cost Detail																
1.0	UWTRANAL	Water Treatment Analysis	4.50 EA	U								300.00			300	1,350
			UCC to Activity:	U								300.00			300	1,350
		Resource List UCC to Activity:		U								300.00			300	1,350

Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
50			Excavation	1.00	LS		38,118				151,060			246,000			435,178	435,178
Detaile																		
50	1		Exc,Stockpile Soil/DA	39,141	CY		25,132				99,600						3	124,733
Detaile																		
CREW Cost Detail																		
		60.0 Days	652.3500 CY/Da	0.0015 Da/CY			2078.88 Cost/Da											
		60.0 Shifts	652.3500 CY/Sh	0.0015 Sh/CY			2078.88 Cost/Sh											
		480.0 Hours	81.5438 CY/Hr	0.0123 Hr/CY			259.86 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	960.00	HR	U	18.86										19	18,106
				UCC to Activity:		U	0.46										0	18,106
	2.0	REXC330	Excavator CAT 325B	960.00	HR	U					82.50						83	79,200
				UCC to Activity:		U					2.02						2	79,200
	1.0	LWSLAB	Site Laborer	480.00	HR	U	14.64										15	7,027
				UCC to Activity:		U	0.18										0	7,027
	1.0	RARTDUMP	Articulating Dump Truck	480.00	HR	U					42.50						43	20,400
				UCC to Activity:		U					0.52						1	20,400
			Resource List Hour Rate:			U	52.36				207.50						260	
			Resource List UCC to Activity:			U	0.64				2.54						3	124,733
50	2		Exc,Stockpile Soil/EA	19,792	CY		12,985				51,460						3	64,445
Detaile																		
CREW Cost Detail																		
		31.0 Days	638.4516 CY/Da	0.0016 Da/CY			2078.88 Cost/Da											
		31.0 Shifts	638.4516 CY/Sh	0.0016 Sh/CY			2078.88 Cost/Sh											
		248.0 Hours	79.8065 CY/Hr	0.0125 Hr/CY			259.86 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	496.00	HR	U	18.86										19	9,355
				UCC to Activity:		U	0.47										0	9,355
	2.0	REXC330	Excavator CAT 325B	496.00	HR	U					82.50						83	40,920
				UCC to Activity:		U					2.07						2	40,920
	1.0	LWSLAB	Site Laborer	248.00	HR	U	14.64										15	3,631
				UCC to Activity:		U	0.18										0	3,631
	1.0	RARTDUMP	Articulating Dump Truck	248.00	HR	U					42.50						43	10,540
				UCC to Activity:		U					0.53						1	10,540
			Resource List Hour Rate:			U	52.36				207.50						260	
			Resource List UCC to Activity:			U	0.66				2.60						3	64,445
50	7		Install Cribbing/Walers	6,000.00	SF									246,000			41	246,000
Detaile																		
LIST Cost Detail																		
	1.0	UCRIBWAL	Install Cribbing/Walers	6,000.00	SF	U								41.00			41	246,000
				UCC to Activity:		U								41.00			41	246,000
			Resource List UCC to Activity:			U								41.00			41	246,000
60			Characterization	1.00	LS									189,610			189,610	189,610
Detaile																		
60	1		Rad Analysis Rad Soils	283.00	EA									113,200			400	113,200
Detaile																		
LIST Cost Detail																		
	1.0	URADANAL	Rad Analysis	283.00	EA	U								400.00			400	113,200
				UCC to Activity:		U								400.00			400	113,200
			Resource List UCC to Activity:			U								400.00			400	113,200
60	2		TCLP Analysis Lead Soil	283.00	EA									76,410			270	76,410
Detaile																		
LIST Cost Detail																		
	1.0	UTCLPAN	TCLP Analysis	283.00	EA	U								270.00			270	76,410
				UCC to Activity:		U								270.00			270	76,410
			Resource List UCC to Activity:			U								270.00			270	76,410
70			Stabilization	1.00	LS		19,324				216,941	125,989		150,787			513,043	513,043
Detaile																		
70	1		Transport Soil Stockpile	23,337	CY		8,852.99				14,371						1	23,225
Detaile																		
CREW Cost Detail																		

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Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
		21.1 Days	1104.192 CY/Da	0.0009	Da/CY			1098.88	Cost/Da									
		21.1 Shifts	1104.192 CY/Sh	0.0009	Sh/CY			1098.88	Cost/Sh									
		169.1 Hours	138.0240 CY/Hr	0.0072	Hr/CY			137.36	Cost/Hr									
	1.0	LWSLAB	Site Laborer	169.08	HR	U	14.64										15	2,475
			UCC to Activity:			U	0.11										0	2,475
	2.0	LWSLOP	Equipment Operator	338.16	HR	U	18.86										19	6,378
			UCC to Activity:			U	0.27										0	6,378
	2.0	RARTDUMP	Articulating Dump Truck	338.16	HR	U					42.50						43	14,372
			UCC to Activity:			U					0.62						1	14,372
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.38				0.62						1	23,225
70	2		Pug Mill Process	23,337	CY						185,569	125,989		122,977			19	434,536
Detaile																		
LIST Cost Detail																		
	1.0	UPUGMOB	Mob/Maintain Pug Mill	2.14	LS	U								18,400			18,400	39,358
			UCC to Activity:			U								1.69			2	39,358
	1.0	UPUGRENT	Pug Mill Rental	7.84	MO	U					9,660.00						9,660	75,765
			UCC to Activity:			U					3.25						3	75,765
	1.0	UPHOSACD	Phosphoric Acid,pH agent	839.93	TN	U						150.00					150	125,990
			UCC to Activity:			U						5.40					5	125,990
	1.0	UACIDPMP	Acid Pump Rental	7.84	MO	U					10,000						10,000	78,432
			UCC to Activity:			U					3.36						3	78,432
	1.0	USTORAGE	Storage of acid,pH red.ag	2.14	LS	U								10,000			10,000	21,390
			UCC to Activity:			U								0.92			1	21,390
	1.0	UPWRPUGM	Power for Pug Mill	2.14	LS	U								15,000			15,000	32,086
			UCC to Activity:			U								1.37			1	32,086
	1.0	UANCEQUP	Ancillary Equip.for Pug	7.84	MO	U					4,000.00						4,000	31,373
			UCC to Activity:			U					1.34						1	31,373
	1.0	ULOADSOL	Load soil into Pug Mill	23,337	CY	U								1.22			1	28,471
			UCC to Activity:			U								1.22			1	28,471
	1.0	ULOADPHS	Load Phosphoric in Pug	546.17	CY	U								1.53			2	836
			UCC to Activity:			U								0.04			0	836
	1.0	ULODPH	Load pH Reduct in Pug	546.17	CY	U								1.53			2	836
			UCC to Activity:			U								0.04			0	836
			Resource List UCC to Activity:			U					7.95	5.40		5.27			19	434,536
70	3		Confirmation Testing	103.00	EA									27,810			270	27,810
Detaile																		
LIST Cost Detail																		
	1.0	UTCLPAN	TCLP Analysis	103.00	EA	U								270.00			270	27,810
			UCC to Activity:			U								270.00			270	27,810
			Resource List UCC to Activity:			U								270.00			270	27,810
70	4		Transport to Stockpile	25,671	CY		10,472				17,000						1	27,472
Detaile																		
CREW Cost Detail																		
		25.0 Days	1026.840 CY/Da	0.0010	Da/CY			1098.88	Cost/Da									
		25.0 Shifts	1026.840 CY/Sh	0.0010	Sh/CY			1098.88	Cost/Sh									
		200.0 Hours	128.3550 CY/Hr	0.0078	Hr/CY			137.36	Cost/Hr									
	1.0	LWSLAB	Site Laborer	200.00	HR	U	14.64										15	2,928
			UCC to Activity:			U	0.11										0	2,928
	2.0	LWSLOP	Equipment Operator	400.00	HR	U	18.86										19	7,544
			UCC to Activity:			U	0.29										0	7,544
	2.0	RARTDUMP	Articulating Dump Truck	400.00	HR	U					42.50						43	17,000
			UCC to Activity:			U					0.66						1	17,000
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.41				0.66						1	27,472
80			Confirmatory Sampling	1.00	LS									136,880			136,880	136,880
Detaile																		
80	1		Confirmatory Sampling	236.00	EA									136,880			580	136,880
Detaile																		
LIST Cost Detail																		
	1.0	URADANAL	Rad Analysis	236.00	EA	U								400.00			400	94,400
			UCC to Activity:			U								400.00			400	94,400
	1.0	UMETLANL	Metals Analysis	236.00	EA	U								180.00			180	42,480
			UCC to Activity:			U								180.00			180	42,480
			Resource List UCC to Activity:			U								580.00			580	136,880

Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
90 Detaile			Additional Excavation	1.00	LS		1,884.96				7,470.00						9,355	9,355
90 Detaile	1		Exc,Stockpile Soil/DA	1,957.00	CY		1,047.20				4,150.00						3	5,197
CREW Cost Detail																		
	2.5 Days		782.8000 CY/Da	0.0013 Da/CY			2078.88 Cost/Da											
	2.5 Shifts		782.8000 CY/Sh	0.0013 Sh/CY			2078.88 Cost/Sh											
	20.0 Hours		97.8500 CY/Hr	0.0102 Hr/CY			259.86 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	40.00	HR	U	18.86										19	754
			UCC to Activity:			U	0.39										0	754
	2.0	REXC330	Excavator CAT 325B	40.00	HR	U					82.50						83	3,300
			UCC to Activity:			U					1.69						2	3,300
	1.0	LWSLAB	Site Laborer	20.00	HR	U	14.64										15	293
			UCC to Activity:			U	0.15										0	293
	1.0	RARTDUMP	Articulating Dump Truck	20.00	HR	U					42.50						43	850
			UCC to Activity:			U					0.43						0	850
			Resource List Hour Rate:			U	52.36				207.50						260	
			Resource List UCC to Activity:			U	0.54				2.12						3	5,197
90 Detaile	2		Exc,Stockpile Soil/EA	990.00	CY		837.76				3,320.00						4	4,158
CREW Cost Detail																		
	2.0 Days		495.0000 CY/Da	0.0020 Da/CY			2078.88 Cost/Da											
	2.0 Shifts		495.0000 CY/Sh	0.0020 Sh/CY			2078.88 Cost/Sh											
	16.0 Hours		61.8750 CY/Hr	0.0162 Hr/CY			259.86 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	32.00	HR	U	18.86										19	604
			UCC to Activity:			U	0.61										1	604
	1.0	LWSLAB	Site Laborer	16.00	HR	U	14.64										15	234
			UCC to Activity:			U	0.24										0	234
	2.0	REXC330	Excavator CAT 325B	32.00	HR	U					82.50						83	2,640
			UCC to Activity:			U					2.67						3	2,640
	1.0	RARTDUMP	Articulating Dump Truck	16.00	HR	U					42.50						43	680
			UCC to Activity:			U					0.69						1	680
			Resource List Hour Rate:			U	52.36				207.50						260	
			Resource List UCC to Activity:			U	0.85				3.35						4	4,158
100 Detaile			Confirmatory Sampling AE	1.00	LS									6,960.00			6,960	6,960
100 Detaile	1		Confirmatory Sampling AE	12.00	EA									6,960.00			580	6,960
LIST Cost Detail																		
	1.0	URADANAL	Rad Analysis	12.00	EA	U								400.00			400	4,800
			UCC to Activity:			U								400.00			400	4,800
	1.0	UMETLANL	Metals Analysis	12.00	EA	U								180.00			180	2,160
			UCC to Activity:			U								180.00			180	2,160
			Resource List UCC to Activity:			U								580.00			580	6,960
110 Detaile			T & D Offsi	1.00	LS		31,834				51,680			13232514		13316028	13316028	
110 Detaile	1		Transport from Stockpile	76,589	CY		31,834				51,680						1	83,515
CREW Cost Detail																		
	76.0 Days		1007.750 CY/Da	0.0010 Da/CY			1098.88 Cost/Da											
	76.0 Shifts		1007.750 CY/Sh	0.0010 Sh/CY			1098.88 Cost/Sh											
	608.0 Hours		125.9688 CY/Hr	0.0079 Hr/CY			137.36 Cost/Hr											
	1.0	LWSLAB	Site Laborer	608.00	HR	U	14.64										15	8,901
			UCC to Activity:			U	0.12										0	8,901
	2.0	LWSLOP	Equipment Operator	1,216.00	HR	U	18.86										19	22,934
			UCC to Activity:			U	0.30										0	22,934
	2.0	RARTDUMP	Articulating Dump Truck	1,216.00	HR	U					42.50						43	51,680
			UCC to Activity:			U					0.67						1	51,680
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.42				0.67						1	83,515

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Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
110	2		T & D Subtitle C (LLRW)	1,250.00	CY									311,875			250	311,875
Detaile																		
LIST Cost Detail																		
	1.0	UDISPEUT	Disposal Subtitle C(LLRW)	1,250.00	CY	U								149.50			150	186,875
				UCC to Activity:		U								149.50			150	186,875
	1.0	UTRANSPT	Transport by Rail	1,250.00	CY	U								100.00			100	125,000
				UCC to Activity:		U								100.00			100	125,000
			Resource List UCC to Activity:			U								249.50			250	311,875
110	3		T & D Subtitle C (LARM)	75,339	CY									12920639			172	12920639
Detaile																		
LIST Cost Detail																		
	1.0	UDISENSF	Disposal Subtitle C(LARM)	75,339	CY	U								71.50			72	5386739
				UCC to Activity:		U								71.50			72	5386739
	1.0	UTRANSPT	Transport by Rail	75,339	CY	U								100.00			100	7533900
				UCC to Activity:		U								100.00			100	7533900
			Resource List UCC to Activity:			U								171.50			172	12920639
120			Offsite Disposal VOC,SVOC	1.00	LS		61.68				100.13			31,725		31,887	31,887	31,887
Detaile																		
120	1		Characterization Sampling	10.00	EA									6,000.00			600	6,000
Detaile																		
LIST Cost Detail																		
	1.0	UVOCANAL	VOC Analysis	10.00	EA	U								225.00			225	2,250
				UCC to Activity:		U								225.00			225	2,250
	1.0	USVOCANL	SVOC Analysis	10.00	EA	U								375.00			375	3,750
				UCC to Activity:		U								375.00			375	3,750
			Resource List UCC to Activity:			U								600.00			600	6,000
120	2		T & D Soils	150.00	TN									25,725			172	25,725
Detaile																		
LIST Cost Detail																		
	1.0	UT&DVOC	T & D VOC Soils	150.00	TN	U								171.50			172	25,725
				UCC to Activity:		U								171.50			172	25,725
			Resource List UCC to Activity:			U								171.50			172	25,725
120	3		Transport to Stockpile	150.00	CY		61.68				100.13						1	162
Detaile																		
CREW Cost Detail																		
		0.1 Days	1018.710 CY/Da	0.0010 Da/CY		1098.88 Cost/Da												
		0.1 Shifts	1018.710 CY/Sh	0.0010 Sh/CY		1098.88 Cost/Sh												
		1.2 Hours	127.3387 CY/Hr	0.0079 Hr/CY		137.36 Cost/Hr												
	1.0	LWSLAB	Site Laborer	1.18	HR	U	14.64										15	17
				UCC to Activity:		U	0.11										0	17
	2.0	LWSLOP	Equipment Operator	2.36	HR	U	18.86										19	44
				UCC to Activity:		U	0.30										0	44
	2.0	RARTDUMP	Articulating Dump Truck	2.36	HR	U					42.50						43	100
				UCC to Activity:		U					0.67						1	100
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.41				0.67						1	162
125			GW Monitoring Wells	10.00	EA									25,000			2,500	25,000
Detaile																		
125	1		GW Monitoring Wells	10.00	EA									25,000			2,500	25,000
Detaile																		
LIST Cost Detail																		
	1.0	UGWELLS	GW Monitoring Wells	10.00	EA	U								2,500.00			2,500	25,000
				UCC to Activity:		U								2,500.00			2,500	25,000
			Resource List UCC to Activity:			U								2,500.00			2,500	25,000
130			Site Restoration	1.00	LS		35,604				127,500	612,612		11,312			787,029	787,029
Detaile																		

Page 5 of 7

Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
130	1	Fill Material	68,068	CY							612,612					9	612,612
Detaile																	
LIST Cost Detail																	
1.0	MFILLMTL	Fill Material	68,068	CY	U						9.00					9	612,612
		UCC to Activity:			U						9.00					9	612,612
		Resource List UCC to Activity:			U						9.00					9	612,612
130	2	Spread,Compact,Grade Fill	68,068	CY		35,604				127,500						2	163,105
Detaile																	
CREW Cost Detail																	
85.0 Days		800.8000 CY/Da	0.0012 Da/CY			1918.88 Cost/Da											
85.0 Shifts		800.8000 CY/Sh	0.0012 Sh/CY			1918.88 Cost/Sh											
680.0 Hours		100.1000 CY/Hr	0.0100 Hr/CY			239.86 Cost/Hr											
2.0	LWSLOP	Equipment Operator	1,360.00	HR	U	18.86										19	25,650
		UCC to Activity:			U	0.38										0	25,650
1.0	LWSLAB	Site Laborer	680.00	HR	U	14.64										15	9,955
		UCC to Activity:			U	0.15										0	9,955
2.0	RCOMPACT	Compactor CAT CS323C	1,360.00	HR	U					93.75						94	127,500
		UCC to Activity:			U					1.87						2	127,500
		Resource List Hour Rate:			U	52.36				187.50						240	
		Resource List UCC to Activity:			U	0.52				1.87						2	163,105
130	1	Seed Area	12.50	AC									11,312			905	11,313
Detaile																	
LIST Cost Detail																	
1.0	USEED	Seeding	12.50	AC	U								905.00			905	11,313
		UCC to Activity:			U								905.00			905	11,313
		Resource List UCC to Activity:			U								905.00			905	11,313
140		Demobilize	1.00	LS		5,360.00							15,000			20,360	20,360
Detaile																	
LIST Cost Detail																	
1.0	UDEMOBTR	Demob Trailers	6.00	EA	U								500.00			500	3,000
		UCC to Activity:			U								3,000.00			3,000	3,000
1.0	UDEMOBEQ	Demob Equipment	10.00	EA	U								300.00			300	3,000
		UCC to Activity:			U								3,000.00			3,000	3,000
1.0	UDISMUTL	Dismantle Utilities	1.00	LS	U								6,000.00			6,000	6,000
		UCC to Activity:			U								6,000.00			6,000	6,000
1.0	UDISPOSL	Disposal of Debris	1.00	LS	U								3,000.00			3,000	3,000
		UCC to Activity:			U								3,000.00			3,000	3,000
		Resource List UCC to Activity:			U								15,000			15,000	15,000
CREW Cost Detail																	
10.0 Days		0.1000 LS/Da	10.0000 Da/LS			536.00 Cost/Da											
10.0 Shifts		0.1000 LS/Sh	10.0000 Sh/LS			536.00 Cost/Sh											
80.0 Hours		0.0125 LS/Hr	80.0000 Hr/LS			67.00 Cost/Hr											
2.0	LWSLOP	Equipment Operator	160.00	HR	U	18.86										19	3,018
		UCC to Activity:			U	3,017.60										3,018	3,018
2.0	LWSLAB	Site Laborer	160.00	HR	U	14.64										15	2,342
		UCC to Activity:			U	2,342.40										2,342	2,342
		Resource List Hour Rate:			U	67.00										67	
		Resource List UCC to Activity:			U	5,360.00										5,360	5,360
150		Indirect Construct Cost	1.00	LS									2209932			2209932	2209932
Detaile																	
150	1	Permit & Legal (5%)	1.00	LS									122,774			122,774	122,774
Detaile																	
LIST Cost Detail																	
1.0	UPERMTLG	Permit & Legal 5%	1.00	LS	U								122,774			122,774	122,774
		UCC to Activity:			U								122,774			122,774	122,774
		Resource List UCC to Activity:			U								122,774			122,774	122,774
150	2	Health & Safety (10%)	1.00	LS									245,548			245,548	245,548
Detaile																	
LIST Cost Detail																	
1.0	UH&S	Health & Safety 10%	1.00	LS	U								245,548			245,548	245,548
		UCC to Activity:			U								245,548			245,548	245,548
		Resource List UCC to Activity:			U								245,548			245,548	245,548

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Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
150	3	Construct Management(10%)	1.00	LS									245,548			245,548	245,548
Detaile																	
LIST Cost Detail																	
1.0	UCONMGMT	Construct Management 10%	1.00	LS	U								245,548			245,548	245,548
		UCC to Activity:			U								245,548			245,548	245,548
		Resource List UCC to Activity:			U								245,548			245,548	245,548
150	4	QA & Oversight (10%)	1.00	LS									245,548			245,548	245,548
Detaile																	
LIST Cost Detail																	
1.0	UQA.OVST	QA & Oversight 10%	1.00	LS	U								245,548			245,548	245,548
		UCC to Activity:			U								245,548			245,548	245,548
		Resource List UCC to Activity:			U								245,548			245,548	245,548
150	5	Bid & Scope Conting.(10%)	1.00	LS									245,548			245,548	245,548
Detaile																	
LIST Cost Detail																	
1.0	UBIDSCPE	Bid & Scope Conting. 10%	1.00	LS	U								245,548			245,548	245,548
		UCC to Activity:			U								245,548			245,548	245,548
		Resource List UCC to Activity:			U								245,548			245,548	245,548
150	6	Cert.Consruct.Report (5%)	1.00	LS									122,774			122,774	122,774
Detaile																	
LIST Cost Detail																	
1.0	UCERTCRP	Cert.Construct Report 5%	1.00	LS	U								122,774			122,774	122,774
		UCC to Activity:			U								122,774			122,774	122,774
		Resource List UCC to Activity:			U								122,774			122,774	122,774
150	7	Surveying/GPS (10%)	1.00	LS									245,548			245,548	245,548
Detaile																	
LIST Cost Detail																	
1.0	USURVEYG	Survey/GPS 10%	1.00	LS	U								245,548			245,548	245,548
		UCC to Activity:			U								245,548			245,548	245,548
		Resource List UCC to Activity:			U								245,548			245,548	245,548
150	8	Office Proj. Mgmt (10%)	1.00	LS									245,548			245,548	245,548
Detaile																	
LIST Cost Detail																	
1.0	UPROJMGM	Office Project Manage 10%	1.00	LS	U								245,548			245,548	245,548
		UCC to Activity:			U								245,548			245,548	245,548
		Resource List UCC to Activity:			U								245,548			245,548	245,548
150	9	Miscellaneous (ODCs) (5%)	1.00	LS									122,774			122,774	122,774
Detaile																	
LIST Cost Detail																	
1.0	UMISC	Miscellanous ODC's 5%	1.00	LS	U								122,774			122,774	122,774
		UCC to Activity:			U								122,774			122,774	122,774
		Resource List UCC to Activity:			U								122,774			122,774	122,774
150	10	Health Physics Support-5%	1.00	LS									122,774			122,774	122,774
Detaile																	
LIST Cost Detail																	
1.0	UHEALPHY	Health Physics Sup. 5%	1.00	LS	U								122,774			122,774	122,774
		UCC to Activity:			U								122,774			122,774	122,774
		Resource List UCC to Activity:			U								122,774			122,774	122,774
150	11	Gen.Contingency (10%)	1.00	LS									245,548			245,548	245,548
Detaile																	
LIST Cost Detail																	
1.0	UGENCONT	General Contingency 10%	1.00	LS	U								245,548			245,548	245,548
		UCC to Activity:			U								245,548			245,548	245,548
		Resource List UCC to Activity:			U								245,548			245,548	245,548
200		Post Closure Activity(PW)	1.00	LS									875,876			875,876	875,876
Detaile																	

Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
200	1	Quarterly Monitoring Well	4.00	EA									805,776			201,444	805,776
Detaile																	
LIST Cost Detail																	
	1.0 UGWMONOM	GW Monitoring sampling	1.62	LS	U								497,700			497,700	805,776
		UCC to Activity:			U								201,444			201,444	805,776
		Resource List UCC to Activity:			U								201,444			201,444	805,776
200	2	CERCLA Reviews	1.00	LS									70,100			70,100	70,100
Detaile																	
LIST Cost Detail																	
	1.0 USUMREPT	Summary Report PresentWth	1.00	LS	U								70,100			70,100	70,100
		UCC to Activity:			U								70,100			70,100	70,100
		Resource List UCC to Activity:			U								70,100			70,100	70,100

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ALTERNATIVE 3B, URBAN RESIDENT

Job Description: Colonie 3B Urban Resident

Proposal Date:
Time:

From: ROY F. WESTON, INC.

Bid Item Number	Bid Item Description	Quantity	UM	Unit Price	Total Price
10	Mobilization & Site Preparation	1.0000	LS	0.00	**0.00**
20	Buried Drums	25.0000	EA	566.04	**14,151.00**
30	Divert Tributary	1.0000	LS	121,596.00	**121,596.00**
40	Dewater Excavation	1.0000	LS	174,609.76	**174,609.76**
50	Excavation	1.0000	LS	435,178.08	**435,178.08**
60	Characterization of Stockpiled Soils	1.0000	LS	189,610.00	**189,610.00**
70	Stabilization of Lead Soils	1.0000	LS	512,894.82	**512,894.82**
80	Confirmatory Sampling	1.0000	LS	136,880.00	**136,880.00**
90	Additional Excavation	1.0000	LS	10,394.40	**10,394.40**
100	Confirmatory Sampling AE	1.0000	LS	6,960.00	**6,960.00**
110	Onsite Disposal of Soil DA	1.0000	LS	75,460.64	**75,460.64**
120	Construct Composite Cover over DA	1.0000	LS	247,624.89	**247,624.89**
130	Transport & Dispose Offsite	1.0000	LS	7,759,428.38	**7,759,428.38**
140	Offsite Disposal VOC,SVOC	1.0000	LS	31,887.80	**31,887.80**
150	Groundwater Monitoring Wells	10.0000	EA	2,500.00	**25,000.00**
160	Site Restoration	1.0000	LS	785,219.30	**785,219.30**
170	Demobilization	1.0000	LS	20,360.00	**20,360.00**
	Direct Construction Cost			Subtotal Running Total	**10,547,255.07** **10,547,255.07**
190	Indirect Construction Cost	1.0000	LS	2,509,045.00	**2,509,045.00**
	Indirect Construction Cost			Subtotal Running Total	**2,509,045.00** **13,056,300.07**
200	Post Closure Activites (Present Worth)	1.0000	LS	1,266,458.30	**1,266,458.30**
				GRAND TOTAL	**14,322,758.37**

Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
10			Mobilization & Site Prep	1.00	LS													
Detaile																		
20			Buried Drums	25.00	EA		536.00				240.00	4,625.00		8,750.00			566	14,151
Detaile																		
20	1		Repackage Drums	25.00	EA		536.00				240.00	4,625.00					216	5,401
Detaile																		
LIST Cost Detail																		
	1.0	HOVERPAC	Overpac Drums	25.00	EA	U						185.00					185	4,625
			UCC to Activity:			U						185.00					185	4,625
			Resource List UCC to Activity:			U						185.00					185	4,625
CREW Cost Detail																		
	2.0 Days		12.5000 EA/Da	0.0800 Da/EA			388.00 Cost/Da											
	2.0 Shifts		12.5000 EA/Sh	0.0800 Sh/EA			388.00 Cost/Sh											
	16.0 Hours		1.5625 EA/Hr	0.6400 Hr/EA			48.50 Cost/Hr											
	1.0	LWSLAB	Site Laborer	16.00	HR	U	14.64										15	234
			UCC to Activity:			U	9.37										9	234
	1.0	LWSLOP	Equipment Operator	16.00	HR	U	18.86										19	302
			UCC to Activity:			U	12.07										12	302
	1.0	RBACKHOE	Backhoe JD 710	16.00	HR	U					15.00						15	240
			UCC to Activity:			U					9.60						10	240
			Resource List Hour Rate:			U	33.50				15.00						49	
			Resource List UCC to Activity:			U	21.44				9.60						31	776
20	2		Offsite Trans&/Disposal	25.00	EA									8,750.00			350	8,750
Detaile																		
LIST Cost Detail																		
	1.0	UT&DRUM	T&D Envirocare UT Drums	25.00	EA	U								350.00			350	8,750
			UCC to Activity:			U								350.00			350	8,750
			Resource List UCC to Activity:			U								350.00			350	8,750
30			Divert Tributary	1.00	LS		4,556.00				16,440	58,600		42,000			121,596	121,596
Detaile																		
30	1		Divert Pipeline	1,000.00	LF		4,020.00				16,200	58,000		42,000			120	120,220
Detaile																		
LIST Cost Detail																		
	1.0	UHORZBOR	Horizontal Boring	100.00	LF	U								420.00			420	42,000
			UCC to Activity:			U								42.00			42	42,000
	1.0	M4'DPIPE	4'dia. pipe	1,000.00	LF	U						58.00					58	58,000
			UCC to Activity:			U						58.00					58	58,000
			Resource List UCC to Activity:			U						58.00		42.00			100	100,000
CREW Cost Detail																		
	Note:		Excavate & Backfill for new pipe.															
			Horizontal Bore under Railroad Tracks.															
	15.0 Days		66.6667 LF/Da	0.0150 Da/LF			1348.00 Cost/Da											
	15.0 Shifts		66.6667 LF/Sh	0.0150 Sh/LF			1348.00 Cost/Sh											
	120.0 Hours		8.3333 LF/Hr	0.1200 Hr/LF			168.50 Cost/Hr											
	1.0	LWSLAB	Site Laborer	120.00	HR	U	14.64										15	1,757
			UCC to Activity:			U	1.76										2	1,757
	1.0	LWSLOP	Equipment Operator	120.00	HR	U	18.86										19	2,263
			UCC to Activity:			U	2.26										2	2,263
	1.0	RBACKHOE	Backhoe JD 710	120.00	HR	U					15.00						15	1,800
			UCC to Activity:			U					1.80						2	1,800
	1.0	RCRANE	Crane W/Operator	120.00	HR	U					120.00						120	14,400
			UCC to Activity:			U					14.40						14	14,400
			Resource List Hour Rate:			U	33.50				135.00						169	
			Resource List UCC to Activity:			U	4.02				16.20						20	20,220
30	2		Plug & Abandon Ex.Culvert	2.00	EA		536.00				240.00	600.00					688	1,376
Detaile																		
LIST Cost Detail																		
	1.0	MPLUGS	48" Pluge	2.00	EA	U						300.00					300	600
			UCC to Activity:			U						300.00					300	600
			Resource List UCC to Activity:			U						300.00					300	600
CREW Cost Detail																		

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Code		Description	Quantity UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
	2.0 Days	1.0000 EA/Da	1.0000 Da/EA			388.00 Cost/Da										
	2.0 Shifts	1.0000 EA/Sh	1.0000 Sh/EA			388.00 Cost/Sh										
	16.0 Hours	0.1250 EA/Hr	8.0000 Hr/EA			48.50 Cost/Hr										
1.0	LWSLAB	Site Laborer	16.00 HR	U	14.64										15	234
			UCC to Activity:	U	117.12										117	234
1.0	LWSLOP	Equipment Operator	16.00 HR	U	18.86										19	302
			UCC to Activity:	U	150.88										151	302
1.0	RBACKHOE	Backhoe JD 710	16.00 HR	U					15.00						15	240
			UCC to Activity:	U					120.00						120	240
		Resource List Hour Rate:		U	33.50				15.00						49	
		Resource List UCC to Activity:		U	268.00				120.00						388	776
40		Dewater Excavation	1.00 LS		145,600							29,009			174,610	174,610
Detaile																
40	1	Operator 24hr/day	20.00 WK		100,800										5,040	100,800
Detaile																
LIST Cost Detail																
	Note:	Operate 24 hous/day														
	420.0 Days	0.0476 WK/Da	21.0000 Da/WK			240.00 Cost/Da										
	420.0 Shifts	0.0476 WK/Sh	21.0000 Sh/WK			240.00 Cost/Sh										
	3360.0 Hours	0.0060 WK/Hr	168.0000 Hr/WK			30.00 Cost/Hr										
1.0	LDWOPER	Dewatering Operator	3,360.00 HR	U	30.00										30	100,800
			UCC to Activity:	U	5,040.00										5,040	100,800
		Weighted Average Hour Rate:		U	30.00										30	
		Resource List UCC to Activity:		U	5,040.00										5,040	100,800
40	2	Change Carbon	5.00 MO									15,000			3,000	15,000
Detaile																
LIST Cost Detail																
	Note:	Change carbon monthly														
1.0	UCARCHNG	Carbon Changeouts	5.00 EA	U								3,000.00			3,000	15,000
			UCC to Activity:	U								3,000.00			3,000	15,000
		Resource List UCC to Activity:		U								3,000.00			3,000	15,000
40	3	Night Shift Supervisor	20.00 WK		44,800										2,240	44,800
Detaile																
LIST Cost Detail																
	Note:	Night shift supervisor 8 hr/day														
	140.0 Days	0.1429 WK/Da	7.0000 Da/WK			320.00 Cost/Da										
	140.0 Shifts	0.1429 WK/Sh	7.0000 Sh/WK			320.00 Cost/Sh										
	1120.0 Hours	0.0179 WK/Hr	56.0000 Hr/WK			40.00 Cost/Hr										
1.0	LDWNOPER	Dewatering Operator Nite	1,120.00 HR	U	40.00										40	44,800
			UCC to Activity:	U	2,240.00										2,240	44,800
		Weighted Average Hour Rate:		U	40.00										40	
		Resource List UCC to Activity:		U	2,240.00										2,240	44,800
40	4	Electricity for Pumps	5.00 MO									11,309			2,262	11,310
Detaile																
LIST Cost Detail																
1.0	UELECTKW	Electricity	3,360.00 HR	U								3.37			3	11,310
			UCC to Activity:	U								2,261.95			2,262	11,310
		Resource List UCC to Activity:		U								2,261.95			2,262	11,310
40	5	Misc. Electric Charge	5.00 MO									1,200.00			240	1,200
Detaile																
LIST Cost Detail																
1.0	UMISCELE	Misc. Electric Charge	5.00 MO	U								240.00			240	1,200
			UCC to Activity:	U								240.00			240	1,200
		Resource List UCC to Activity:		U								240.00			240	1,200
40	6	Water Treatment Analysis	5.00 EA									1,500.00			300	1,500
Detaile																
LIST Cost Detail																
1.0	UWTRANAL	Water Treatment Analysis	5.00 EA	U								300.00			300	1,500
			UCC to Activity:	U								300.00			300	1,500
		Resource List UCC to Activity:		U								300.00			300	1,500

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Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
50			Excavation	1.00	LS		38,118				151,060			246,000			435,178	435,178
Detaile																		
50	1		Exc,Stockpile Soil/DA	39,141	CY		25,132				99,600						3	124,733
Detaile																		
CREW Cost Detail																		
		60.0 Days	652.3500 CY/Da	0.0015 Da/CY			2078.88 Cost/Da											
		60.0 Shifts	652.3500 CY/Sh	0.0015 Sh/CY			2078.88 Cost/Sh											
		480.0 Hours	81.5438 CY/Hr	0.0123 Hr/CY			259.86 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	960.00	HR	U	18.86										19	18,106
				UCC to Activity:		U	0.46										0	18,106
	2.0	REXC330	Excavator CAT 325B	960.00	HR	U					82.50						83	79,200
				UCC to Activity:		U					2.02						2	79,200
	1.0	LWSLAB	Site Laborer	480.00	HR	U	14.64										15	7,027
				UCC to Activity:		U	0.18										0	7,027
	1.0	RARTDUMP	Articulating Dump Truck	480.00	HR	U					42.50						43	20,400
				UCC to Activity:		U					0.52						1	20,400
			Resource List Hour Rate:			U	52.36				207.50						260	
			Resource List UCC to Activity:			U	0.64				2.54						3	124,733
50	2		Exc,Stockpile Soil/EA	19,792	CY		12,985				51,460						3	64,445
Detaile																		
CREW Cost Detail																		
		31.0 Days	638.4516 CY/Da	0.0016 Da/CY			2078.88 Cost/Da											
		31.0 Shifts	638.4516 CY/Sh	0.0016 Sh/CY			2078.88 Cost/Sh											
		248.0 Hours	79.8065 CY/Hr	0.0125 Hr/CY			259.86 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	496.00	HR	U	18.86										19	9,355
				UCC to Activity:		U	0.47										0	9,355
	2.0	REXC330	Excavator CAT 325B	496.00	HR	U					82.50						83	40,920
				UCC to Activity:		U					2.07						2	40,920
	1.0	LWSLAB	Site Laborer	248.00	HR	U	14.64										15	3,631
				UCC to Activity:		U	0.18										0	3,631
	1.0	RARTDUMP	Articulating Dump Truck	248.00	HR	U					42.50						43	10,540
				UCC to Activity:		U					0.53						1	10,540
			Resource List Hour Rate:			U	52.36				207.50						260	
			Resource List UCC to Activity:			U	0.66				2.60						3	64,445
50	7		Install Cribbing/Walers	6,000.00	SF									246,000			41	246,000
Detaile																		
LIST Cost Detail																		
	1.0	UCRIBWAL	Install Cribbing/Walers	6,000.00	SF	U								41.00			41	246,000
				UCC to Activity:		U								41.00			41	246,000
			Resource List UCC to Activity:			U								41.00			41	246,000
60			Characterization	1.00	LS									189,610			189,610	189,610
Detaile																		
60	1		Rad Analysis Rad Soils	283.00	EA									113,200			400	113,200
Detaile																		
LIST Cost Detail																		
	1.0	URADANAL	Rad Analysis	283.00	EA	U								400.00			400	113,200
				UCC to Activity:		U								400.00			400	113,200
			Resource List UCC to Activity:			U								400.00			400	113,200
60	2		TCLP Analysis Lead Soil	283.00	EA									76,410			270	76,410
Detaile																		
LIST Cost Detail																		
	1.0	UTCLPAN	TCLP Analysis	283.00	EA	U								270.00			270	76,410
				UCC to Activity:		U								270.00			270	76,410
			Resource List UCC to Activity:			U								270.00			270	76,410
70			Stabilization	1.00	LS		19,268				216,849	125,989		150,787			512,895	512,895
Detaile																		
70	1		Transport Soil Stockpile	23,337	CY		8,796.48				14,280						1	23,076
Detaile																		
CREW Cost Detail																		

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Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
	21.0 Days	1111.286 CY/Da		0.0009	Da/CY			1098.88	Cost/Da									
	21.0 Shifts	1111.286 CY/Sh		0.0009	Sh/CY			1098.88	Cost/Sh									
	168.0 Hours	138.9107 CY/Hr		0.0072	Hr/CY			137.36	Cost/Hr									
	1.0 LWSLAB		Site Laborer	168.00	HR	U	14.64										15	2,460
				UCC to Activity:		U	0.11										0	2,460
	2.0 LWSLOP		Equipment Operator	336.00	HR	U	18.86										19	6,337
				UCC to Activity:		U	0.27										0	6,337
	2.0 RARTDUMP		Articulating Dump Truck	336.00	HR	U					42.50						43	14,280
				UCC to Activity:		U					0.61						1	14,280
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.38				0.61						1	23,076
70	2		Pug Mill Process	23,337	CY						185,569	125,989		122,977			19	434,536
Detaile																		
LIST Cost Detail																		
	1.0 UPUGMOB		Mob/Maintain Pug Mill	2.14	LS	U								18,400			18,400	39,358
				UCC to Activity:		U								1.69			2	39,358
	1.0 UPUGRENT		Pug Mill Rental	7.84	MO	U					9,660.00						9,660	75,765
				UCC to Activity:		U					3.25						3	75,765
	1.0 UPHOSACD		Phosphoric Acid,pH agent	839.93	TN	U						150.00					150	125,990
				UCC to Activity:		U						5.40					5	125,990
	1.0 UACIDPMP		Acid Pump Rental	7.84	MO	U					10,000						10,000	78,432
				UCC to Activity:		U					3.36						3	78,432
	1.0 USTORAGE		Storage of acid,pH red.ag	2.14	LS	U								10,000			10,000	21,390
				UCC to Activity:		U								0.92			1	21,390
	1.0 UPWRPUGM		Power for Pug Mill	2.14	LS	U								15,000			15,000	32,086
				UCC to Activity:		U								1.37			1	32,086
	1.0 UANCEQUP		Ancillary Equip.for Pug	7.84	MO	U					4,000.00						4,000	31,373
				UCC to Activity:		U					1.34						1	31,373
	1.0 ULOADSOL		Load soil into Pug Mill	23,337	CY	U								1.22			1	28,471
				UCC to Activity:		U								1.22			1	28,471
	1.0 ULOADPHS		Load Phosphoric in Pug	546.17	CY	U								1.53			2	836
				UCC to Activity:		U								0.04			0	836
	1.0 ULODPH		Load pH Reduct in Pug	546.17	CY	U								1.53			2	836
				UCC to Activity:		U								0.04			0	836
			Resource List UCC to Activity:			U					7.95	5.40		5.27			19	434,536
70	3		Confirmation Testing	103.00	EA									27,810			270	27,810
Detaile																		
LIST Cost Detail																		
	1.0 UTCLPAN		TCLP Analysis	103.00	EA	U								270.00			270	27,810
				UCC to Activity:		U								270.00			270	27,810
			Resource List UCC to Activity:			U								270.00			270	27,810
70	4		Transport to Stockpile	25,671	CY		10,472				17,000						1	27,472
Detaile																		
CREW Cost Detail																		
	25.0 Days	1026.840 CY/Da		0.0010	Da/CY			1098.88	Cost/Da									
	25.0 Shifts	1026.840 CY/Sh		0.0010	Sh/CY			1098.88	Cost/Sh									
	200.0 Hours	128.3550 CY/Hr		0.0078	Hr/CY			137.36	Cost/Hr									
	1.0 LWSLAB		Site Laborer	200.00	HR	U	14.64										15	2,928
				UCC to Activity:		U	0.11										0	2,928
	2.0 LWSLOP		Equipment Operator	400.00	HR	U	18.86										19	7,544
				UCC to Activity:		U	0.29										0	7,544
	2.0 RARTDUMP		Articulating Dump Truck	400.00	HR	U					42.50						43	17,000
				UCC to Activity:		U					0.66						1	17,000
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.41				0.66						1	27,472
80			Confirmatory Sampling	1.00	LS									136,880			136,880	136,880
Detaile																		
80	1		Confirmatory Sampling	236.00	EA									136,880			580	136,880
Detaile																		
LIST Cost Detail																		
	1.0 URADANAL		Rad Analysis	236.00	EA	U								400.00			400	94,400
				UCC to Activity:		U								400.00			400	94,400
	1.0 UMETALAN		Metals Analysis	236.00	EA	U								180.00			180	42,480
				UCC to Activity:		U								180.00			180	42,480
			Resource List UCC to Activity:			U								580.00			580	136,880

Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
90 Detaile			Additional Excavation	1.00	LS		2,094.40				8,300.00						10,394	10,394
90 Detaile	1		Exc,Stockpile Soil/DA	1,957.00	CY		1,256.64				4,980.00						3	6,237
CREW Cost Detail																		
	3.0 Days		652.3333 CY/Da	0.0015 Da/CY			2078.88 Cost/Da											
	3.0 Shifts		652.3333 CY/Sh	0.0015 Sh/CY			2078.88 Cost/Sh											
	24.0 Hours		81.5417 CY/Hr	0.0123 Hr/CY			259.86 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	48.00	HR	U	18.86										19	905
			UCC to Activity:			U	0.46										0	905
	2.0	REXC330	Excavator CAT 325B	48.00	HR	U					82.50						83	3,960
			UCC to Activity:			U					2.02						2	3,960
	1.0	LWSLAB	Site Laborer	24.00	HR	U	14.64										15	351
			UCC to Activity:			U	0.18										0	351
	1.0	RARTDUMP	Articulating Dump Truck	24.00	HR	U					42.50						43	1,020
			UCC to Activity:			U					0.52						1	1,020
			Resource List Hour Rate:			U	52.36				207.50						260	
			Resource List UCC to Activity:			U	0.64				2.54						3	6,237
90 Detaile	2		Exc,Stockpile Soil/EA	990.00	CY		837.76				3,320.00						4	4,158
CREW Cost Detail																		
	2.0 Days		495.0000 CY/Da	0.0020 Da/CY			2078.88 Cost/Da											
	2.0 Shifts		495.0000 CY/Sh	0.0020 Sh/CY			2078.88 Cost/Sh											
	16.0 Hours		61.8750 CY/Hr	0.0162 Hr/CY			259.86 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	32.00	HR	U	18.86										19	604
			UCC to Activity:			U	0.61										1	604
	1.0	LWSLAB	Site Laborer	16.00	HR	U	14.64										15	234
			UCC to Activity:			U	0.24										0	234
	2.0	REXC330	Excavator CAT 325B	32.00	HR	U					82.50						83	2,640
			UCC to Activity:			U					2.67						3	2,640
	1.0	RARTDUMP	Articulating Dump Truck	16.00	HR	U					42.50						43	680
			UCC to Activity:			U					0.69						1	680
			Resource List Hour Rate:			U	52.36				207.50						260	
			Resource List UCC to Activity:			U	0.85				3.35						4	4,158
100 Detaile			Confirmatory Sampling AE	1.00	LS									6,960.00			6,960	6,960
100 Detaile	1		Confirmatory Sampling AE	12.00	EA									6,960.00			580	6,960
LIST Cost Detail																		
	1.0	URADANAL	Rad Analysis	12.00	EA	U								400.00			400	4,800
			UCC to Activity:			U								400.00			400	4,800
	1.0	UMETALAN	Metals Analysis	12.00	EA	U								180.00			180	2,160
			UCC to Activity:			U								180.00			180	2,160
			Resource List UCC to Activity:			U								580.00			580	6,960
110 Detaile			Onsite Disposal Soil DA	1.00	LS		22,200				53,260						75,461	75,461
110 Detaile	1		Transport from Stockpile	32,400	CY		13,404				21,760						1	35,164
CREW Cost Detail																		
	32.0 Days		1012.500 CY/Da	0.0010 Da/CY			1098.88 Cost/Da											
	32.0 Shifts		1012.500 CY/Sh	0.0010 Sh/CY			1098.88 Cost/Sh											
	256.0 Hours		126.5625 CY/Hr	0.0079 Hr/CY			137.36 Cost/Hr											
	1.0	LWSLAB	Site Laborer	256.00	HR	U	14.64										15	3,748
			UCC to Activity:			U	0.12										0	3,748
	2.0	LWSLOP	Equipment Operator	512.00	HR	U	18.86										19	9,656
			UCC to Activity:			U	0.30										0	9,656
	2.0	RARTDUMP	Articulating Dump Truck	512.00	HR	U					42.50						43	21,760
			UCC to Activity:			U					0.67						1	21,760
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.41				0.67						1	35,164

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Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
110	2		Place & Compact Soil	32,400	CY		8,796.48				31,500						1	40,296
Detaile																		
CREW Cost Detail																		
	21.0 Days		1542.857 CY/Da		0.0006 Da/CY			1918.88 Cost/Da										
	21.0 Shifts		1542.857 CY/Sh		0.0006 Sh/CY			1918.88 Cost/Sh										
	168.0 Hours		192.8571 CY/Hr		0.0052 Hr/CY			239.86 Cost/Hr										
	2.0	LWSLOP	Equipment Operator	336.00	HR	U	18.86										19	6,337
				UCC to Activity:		U	0.20										0	6,337
	1.0	LWSLAB	Site Laborer	168.00	HR	U	14.64										15	2,460
				UCC to Activity:		U	0.08										0	2,460
	2.0	RCOMPACT	Compactor CAT CS323C	336.00	HR	U					93.75						94	31,500
				UCC to Activity:		U					0.97						1	31,500
			Resource List Hour Rate:			U	52.36				187.50						240	
			Resource List UCC to Activity:			U	0.27				0.97						1	40,296
120			Composite Cover DA	1.00	LS		8,981.19				17,706	180,937		39,998			247,625	247,625
Detaile																		
120	1		18" Compacted Clay	4,269.00	CY		1,882.31				5,706.98	34,152					10	41,741
Detaile																		
LIST Cost Detail																		
	1.0	MCLAY	Clay	4,269.00	CY	U						8.00					8	34,152
				UCC to Activity:		U						8.00					8	34,152
			Resource List UCC to Activity:			U						8.00					8	34,152
CREW Cost Detail																		
	4.5 Days		950.0000 CY/Da		0.0011 Da/CY			1688.88 Cost/Da										
	4.5 Shifts		950.0000 CY/Sh		0.0011 Sh/CY			1688.88 Cost/Sh										
	35.9 Hours		118.7500 CY/Hr		0.0084 Hr/CY			211.11 Cost/Hr										
	2.0	LWSLOP	Equipment Operator	71.90	HR	U	18.86										19	1,356
				UCC to Activity:		U	0.32										0	1,356
	1.0	RDOZERD8	CAT D-8 Dozer	35.95	HR	U					65.00						65	2,337
				UCC to Activity:		U					0.55						1	2,337
	1.0	LWSLAB	Site Laborer	35.95	HR	U	14.64										15	526
				UCC to Activity:		U	0.12										0	526
	1.0	RCOMPACT	Compactor CAT CS323C	35.95	HR	U					93.75						94	3,370
				UCC to Activity:		U					0.79						1	3,370
			Resource List Hour Rate:			U	52.36				158.75						211	
			Resource List UCC to Activity:			U	0.44				1.34						2	7,589
120	2		12oz Non-Woven Geotextile	83,888	SF		1,405.44					17,616					0	19,022
Detaile																		
LIST Cost Detail																		
	1.0	MGEOTEXT	Geotextile Fabric	83,888	SF	U						0.21					0	17,616
				UCC to Activity:		U						0.21					0	17,616
			Resource List UCC to Activity:			U						0.21					0	17,616
CREW Cost Detail																		
	6.0 Days		13981.33 SF/Da		0.0001 Da/SF			234.24 Cost/Da										
	6.0 Shifts		13981.33 SF/Sh		0.0001 Sh/SF			234.24 Cost/Sh										
	48.0 Hours		1747.667 SF/Hr		0.0006 Hr/SF			29.28 Cost/Hr										
	2.0	LWSLAB	Site Laborer	96.00	HR	U	14.64										15	1,405
				UCC to Activity:		U	0.02										0	1,405
			Resource List Hour Rate:			U	29.28										29	
			Resource List UCC to Activity:			U	0.02										0	1,405
120	3		40mil PVC Geomembrane	83,888	SF									35,232			0	35,233
Detaile																		
LIST Cost Detail																		
	1.0	U40MILNR	40 mil Liner	83,888	SF	U								0.42			0	35,233
				UCC to Activity:		U								0.42			0	35,233
			Resource List UCC to Activity:			U								0.42			0	35,233

Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
120	4	Drainage Net	83,888	SF		936.96					8,388.80					0	9,326
Detaile																	
LIST Cost Detail																	
	1.0 MDRAINET	Drainage Net	83,888	SF	U						0.10					0	8,389
		UCC to Activity:			U						0.10					0	8,389
		Resource List UCC to Activity:			U						0.10					0	8,389
CREW Cost Detail																	
	4.0 Days	20972.00 SF/Da	0.0000 Da/SF			234.24 Cost/Da											
	4.0 Shifts	20972.00 SF/Sh	0.0000 Sh/SF			234.24 Cost/Sh											
	32.0 Hours	2621.500 SF/Hr	0.0004 Hr/SF			29.28 Cost/Hr											
	2.0 LWSLAB	Site Laborer	64.00	HR	U	14.64										15	937
		UCC to Activity:			U	0.01										0	937
		Resource List Hour Rate:			U	29.28										29	
		Resource List UCC to Activity:			U	0.01										0	937
120	5	6oz Non-Woven Geotextile	83,888	SF		1,405.44					17,616					0	19,022
Detaile																	
LIST Cost Detail																	
	1.0 MGEOTEXT	Geotextile Fabric	83,888	SF	U						0.21					0	17,616
		UCC to Activity:			U						0.21					0	17,616
		Resource List UCC to Activity:			U						0.21					0	17,616
CREW Cost Detail																	
	6.0 Days	13981.33 SF/Da	0.0001 Da/SF			234.24 Cost/Da											
	6.0 Shifts	13981.33 SF/Sh	0.0001 Sh/SF			234.24 Cost/Sh											
	48.0 Hours	1747.667 SF/Hr	0.0006 Hr/SF			29.28 Cost/Hr											
	2.0 LWSLAB	Site Laborer	96.00	HR	U	14.64										15	1,405
		UCC to Activity:			U	0.02										0	1,405
		Resource List Hour Rate:			U	29.28										29	
		Resource List UCC to Activity:			U	0.02										0	1,405
120	6	Barrier Protection Soil	6,214.00	CY		2,513.28				9,000.00	78,300					14	89,813
Detaile																	
LIST Cost Detail																	
	1.0 MFILLMTL	Fill Material	8,700.00	CY	U						9.00					9	78,300
		UCC to Activity:			U						12.60					13	78,300
		Resource List UCC to Activity:			U						12.60					13	78,300
CREW Cost Detail																	
	6.0 Days	1035.667 CY/Da	0.0010 Da/CY			1918.88 Cost/Da											
	6.0 Shifts	1035.667 CY/Sh	0.0010 Sh/CY			1918.88 Cost/Sh											
	48.0 Hours	129.4583 CY/Hr	0.0077 Hr/CY			239.86 Cost/Hr											
	2.0 LWSLOP	Equipment Operator	96.00	HR	U	18.86										19	1,811
		UCC to Activity:			U	0.29										0	1,811
	1.0 LWSLAB	Site Laborer	48.00	HR	U	14.64										15	703
		UCC to Activity:			U	0.11										0	703
	2.0 RCOMPACT	Compactor CAT CS323C	96.00	HR	U					93.75						94	9,000
		UCC to Activity:			U					1.45						1	9,000
		Resource List Hour Rate:			U	52.36				187.50						240	
		Resource List UCC to Activity:			U	0.40				1.45						2	11,513
120	7	Topsoil	1,554.00	CY		837.76				3,000.00	24,864					18	28,702
Detaile																	
LIST Cost Detail																	
	1.0 MTOPSOIL	Topsoil	1,554.00	CY	U						16.00					16	24,864
		UCC to Activity:			U						16.00					16	24,864
		Resource List UCC to Activity:			U						16.00					16	24,864
CREW Cost Detail																	
	2.0 Days	777.0000 CY/Da	0.0013 Da/CY			1918.88 Cost/Da											
	2.0 Shifts	777.0000 CY/Sh	0.0013 Sh/CY			1918.88 Cost/Sh											
	16.0 Hours	97.1250 CY/Hr	0.0103 Hr/CY			239.86 Cost/Hr											

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Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
	2.0	LWSLOP	Equipment Operator	32.00	HR	U	18.86										19	604
			UCC to Activity:			U	0.39										0	604
	1.0	LWSLAB	Site Laborer	16.00	HR	U	14.64										15	234
			UCC to Activity:			U	0.15										0	234
	2.0	RCOMPACT	Compactor CAT CS323C	32.00	HR	U					93.75						94	3,000
			UCC to Activity:			U					1.93						2	3,000
			Resource List Hour Rate:			U	52.36				187.50						240	
			Resource List UCC to Activity:			U	0.54				1.93						2	3,838
120	8		Vegetative Cover	85,788	SF									4,766.00			0	4,766
Detaile																		
LIST Cost Detail																		
	1.0	USEEDING	Seeding	9,532.00	SY	U								0.50			1	4,766
			UCC to Activity:			U								0.06			0	4,766
			Resource List UCC to Activity:			U								0.06			0	4,766
130			T & D Offsite	1.00	LS		31,834				51,680			7675914		7759428	7759428	7759428
Detaile																		
130	1		Transport from Stockpile	76,589	CY		31,834				51,680						1	83,515
Detaile																		
CREW Cost Detail																		
	76.0 Days		1007.750 CY/Da		0.0010 Da/CY		1098.88 Cost/Da											
	76.0 Shifts		1007.750 CY/Sh		0.0010 Sh/CY		1098.88 Cost/Sh											
	608.0 Hours		125.9688 CY/Hr		0.0079 Hr/CY		137.36 Cost/Hr											
	1.0	LWSLAB	Site Laborer	608.00	HR	U	14.64										15	8,901
			UCC to Activity:			U	0.12										0	8,901
	2.0	LWSLOP	Equipment Operator	1,216.00	HR	U	18.86										19	22,934
			UCC to Activity:			U	0.30										0	22,934
	2.0	RARTDUMP	Articulating Dump Truck	1,216.00	HR	U					42.50						43	51,680
			UCC to Activity:			U					0.67						1	51,680
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.42				0.67						1	83,515
130	2		T & D Subtitle C (LLRW)	1,250.00	CY									311,875			250	311,875
Detaile																		
LIST Cost Detail																		
	Note:		1cy = 1.2tons															
	1.0	UDISPEUT	Disposal Subtitle C(LLRW)	1,250.00	CY	U								149.50			150	186,875
			UCC to Activity:			U								149.50			150	186,875
	1.0	UTRANSPT	Transport by Rail	1,250.00	CY	U								100.00			100	125,000
			UCC to Activity:			U								100.00			100	125,000
			Resource List UCC to Activity:			U								249.50			250	311,875
130	3		T & D Subtitle C (LARM)	42,939	CY									7364039			172	7364039
Detaile																		
LIST Cost Detail																		
	Note:		1cy = 1.2tons															
	1.0	UDISENSF	Disposal Subtitle C(LARM)	42,939	CY	U								71.50			72	3070139
			UCC to Activity:			U								71.50			72	3070139
	1.0	UTRANSPT	Transport by Rail	42,939	CY	U								100.00			100	4293900
			UCC to Activity:			U								100.00			100	4293900
			Resource List UCC to Activity:			U								171.50			172	7364039
130	4		T & D Soils Subtitle D LF	0.06	CY													
Detaile																		
LIST Cost Detail																		
	Note:		1 cy = 1.2 tons															
	1.0	UT&DVOC	T & D VOC Soils	0.00	TN	U												
140			Offsite Disposal VOC,SVOC	1.00	LS		62.06				100.74			31,725		31,888	31,888	31,888
Detaile																		

Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
140	1		Characterization Sampling	10.00	EA									6,000.00			600	6,000
Detaile																		
LIST Cost Detail																		
	1.0	UVOCANAL	VOC Analysis	10.00	EA	U								225.00			225	2,250
				UCC to Activity:		U								225.00			225	2,250
	1.0	USVOCANL	SVOC Analysis	10.00	EA	U								375.00			375	3,750
				UCC to Activity:		U								375.00			375	3,750
			Resource List UCC to Activity:			U								600.00			600	6,000
140	2		T & D Soils	150.00	TN									25,725			172	25,725
Detaile																		
LIST Cost Detail																		
	1.0	UT&DSUBD	T & D Subtitle D Landfill	150.00	TN	U								171.50			172	25,725
				UCC to Activity:		U								171.50			172	25,725
			Resource List UCC to Activity:			U								171.50			172	25,725
140	3		Transport to Stockpile	150.00	CY		62.06				100.74						1	163
Detaile																		
CREW Cost Detail																		
	0.1 Days		1012.500 CY/Da	0.0010 Da/CY			1098.88 Cost/Da											
	0.1 Shifts		1012.500 CY/Sh	0.0010 Sh/CY			1098.88 Cost/Sh											
	1.2 Hours		126.5625 CY/Hr	0.0079 Hr/CY			137.36 Cost/Hr											
	1.0	LWSLAB	Site Laborer	1.19	HR	U	14.64										15	17
				UCC to Activity:		U	0.12										0	17
	2.0	LWSLOP	Equipment Operator	2.37	HR	U	18.86										19	45
				UCC to Activity:		U	0.30										0	45
	2.0	RARTDUMP	Articulating Dump Truck	2.37	HR	U					42.50						43	101
				UCC to Activity:		U					0.67						1	101
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.41				0.67						1	163
150			GW Monitoring Wells	10.00	EA									25,000			2,500	25,000
Detaile																		
150	1		GW Monitoring Wells	10.00	EA									25,000			2,500	25,000
Detaile																		
LIST Cost Detail																		
	1.0	UGWELLS	GW Monitoring Wells	10.00	EA	U								2,500.00			2,500	25,000
				UCC to Activity:		U								2,500.00			2,500	25,000
			Resource List UCC to Activity:			U								2,500.00			2,500	25,000
160			Site Restoration EA	1.00	LS		35,604				127,500	612,612		9,502.50			785,219	785,219
Detaile																		
160	1		Fill Material	68,068	CY							612,612					9	612,612
Detaile																		
LIST Cost Detail																		
	1.0	MFILLMTL	Fill Material	68,068	CY	U						9.00					9	612,612
				UCC to Activity:		U						9.00					9	612,612
			Resource List UCC to Activity:			U						9.00					9	612,612
160	2		Spread,Compact,Grade Fill	68,068	CY		35,604				127,500						2	163,105
Detaile																		
CREW Cost Detail																		
	85.0 Days		800.8000 CY/Da	0.0012 Da/CY			1918.88 Cost/Da											
	85.0 Shifts		800.8000 CY/Sh	0.0012 Sh/CY			1918.88 Cost/Sh											
	680.0 Hours		100.1000 CY/Hr	0.0100 Hr/CY			239.86 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	1,360.00	HR	U	18.86										19	25,650
				UCC to Activity:		U	0.38										0	25,650
	1.0	LWSLAB	Site Laborer	680.00	HR	U	14.64										15	9,955
				UCC to Activity:		U	0.15										0	9,955
	2.0	RCOMPACT	Compactor CAT CS323C	1,360.00	HR	U					93.75						94	127,500
				UCC to Activity:		U					1.87						2	127,500
			Resource List Hour Rate:			U	52.36				187.50						240	
			Resource List UCC to Activity:			U	0.52				1.87						2	163,105

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Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
160	3		Seed Area	10.50	AC									9,502.50			905	9,503
Detaile																		
LIST Cost Detail																		
	1.0	USEED	Seeding	10.50	AC	U								905.00			905	9,503
				UCC to Activity:		U								905.00			905	9,503
			Resource List UCC to Activity:			U								905.00			905	9,503
170			Demobilization	1.00	LS		5,360.00							15,000			20,360	20,360
Detaile																		
LIST Cost Detail																		
	1.0	UDEMOBTR	Demob Trailers	6.00	EA	U								500.00			500	3,000
				UCC to Activity:		U								3,000.00			3,000	3,000
	1.0	UDEMOBEQ	Demob Equipment	10.00	EA	U								300.00			300	3,000
				UCC to Activity:		U								3,000.00			3,000	3,000
	1.0	UDISMUTL	Dismantle Utilities	1.00	LS	U								6,000.00			6,000	6,000
				UCC to Activity:		U								6,000.00			6,000	6,000
	1.0	UDISPOSL	Disposal of Debris	1.00	LS	U								3,000.00			3,000	3,000
				UCC to Activity:		U								3,000.00			3,000	3,000
			Resource List UCC to Activity:			U								15,000			15,000	15,000
CREW Cost Detail																		
	10.0 Days		0.1000 LS/Da	10.0000 Da/LS		536.00 Cost/Da												
	10.0 Shifts		0.1000 LS/Sh	10.0000 Sh/LS		536.00 Cost/Sh												
	80.0 Hours		0.0125 LS/Hr	80.0000 Hr/LS		67.00 Cost/Hr												
	2.0	LWSLOP	Equipment Operator	160.00	HR	U	18.86										19	3,018
				UCC to Activity:		U	3,017.60										3,018	3,018
	2.0	LWSLAB	Site Laborer	160.00	HR	U	14.64										15	2,342
				UCC to Activity:		U	2,342.40										2,342	2,342
			Resource List Hour Rate:			U	67.00										67	
			Resource List UCC to Activity:			U	5,360.00										5,360	5,360
190			Indirect Construct Cost	1.00	LS									2509045			2509045	2509045
Detaile																		
190	1		Permit & Legal (5%)	1.00	LS									139,391			139,391	139,391
Detaile																		
LIST Cost Detail																		
	1.0	UPERMLGL	Permit & Legal 5%	1.00	LS	U								139,391			139,391	139,391
				UCC to Activity:		U								139,391			139,391	139,391
			Resource List UCC to Activity:			U								139,391			139,391	139,391
190	2		Health & Safety (10%)	1.00	LS									278,783			278,783	278,783
Detaile																		
LIST Cost Detail																		
	1.0	UH&S	Health & Safety 10%	1.00	LS	U								278,783			278,783	278,783
				UCC to Activity:		U								278,783			278,783	278,783
			Resource List UCC to Activity:			U								278,783			278,783	278,783
190	3		Construct Management(10%)	1.00	LS									278,783			278,783	278,783
Detaile																		
LIST Cost Detail																		
	1.0	UCONSTMG	Construct Manage 10%	1.00	LS	U								278,783			278,783	278,783
				UCC to Activity:		U								278,783			278,783	278,783
			Resource List UCC to Activity:			U								278,783			278,783	278,783
190	4		QA & Oversight (10%)	1.00	LS									278,783			278,783	278,783
Detaile																		
LIST Cost Detail																		
	1.0	UQAOVEST	QA & Oversight 10%	1.00	LS	U								278,783			278,783	278,783
				UCC to Activity:		U								278,783			278,783	278,783
			Resource List UCC to Activity:			U								278,783			278,783	278,783
190	5		Bid & Scope Conting.(10%)	1.00	LS									278,783			278,783	278,783
Detaile																		
LIST Cost Detail																		
	1.0	UBIDSCPE	Bid & Scope Conting. 10%	1.00	LS	U								278,783			278,783	278,783
				UCC to Activity:		U								278,783			278,783	278,783
			Resource List UCC to Activity:			U								278,783			278,783	278,783

Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
190	6	Cert.Consruct.Report (5%)	1.00	LS									139,391			139,391	139,391
Detaile																	
LIST Cost Detail																	
1.0	UCERTREP	Cert. Constrct. Report 5%	1.00	LS	U								139,391			139,391	139,391
		UCC to Activity:			U								139,391			139,391	139,391
		Resource List UCC to Activity:			U								139,391			139,391	139,391
190	7	Surveying/GPS (10%)	1.00	LS									278,783			278,783	278,783
Detaile																	
LIST Cost Detail																	
1.0	USURVEYG	Survey/GPS 10%	1.00	LS	U								278,783			278,783	278,783
		UCC to Activity:			U								278,783			278,783	278,783
		Resource List UCC to Activity:			U								278,783			278,783	278,783
190	8	Office Proj. Mgmt (10%)	1.00	LS									278,783			278,783	278,783
Detaile																	
LIST Cost Detail																	
1.0	UPROJMGM	Office Project Manage 10%	1.00	LS	U								278,783			278,783	278,783
		UCC to Activity:			U								278,783			278,783	278,783
		Resource List UCC to Activity:			U								278,783			278,783	278,783
190	9	Miscellaneous (ODCs) (5%)	1.00	LS									139,391			139,391	139,391
Detaile																	
LIST Cost Detail																	
1.0	UMISC	Miscellaneous ODC's 5%	1.00	LS	U								139,391			139,391	139,391
		UCC to Activity:			U								139,391			139,391	139,391
		Resource List UCC to Activity:			U								139,391			139,391	139,391
190	10	Health Physics Support-5%	1.00	LS									139,391			139,391	139,391
Detaile																	
LIST Cost Detail																	
1.0	UHEALPHY	Health Physics Sup. 5%	1.00	LS	U								139,391			139,391	139,391
		UCC to Activity:			U								139,391			139,391	139,391
		Resource List UCC to Activity:			U								139,391			139,391	139,391
190	11	Gen.Contingency (10%)	1.00	LS									278,783			278,783	278,783
Detaile																	
LIST Cost Detail																	
1.0	UGENCONT	General Contingency 10%	1.00	LS	U								278,783			278,783	278,783
		UCC to Activity:			U								278,783			278,783	278,783
		Resource List UCC to Activity:			U								278,783			278,783	278,783
200		Post Closure Activity(PM)	1.00	LS									1266458			1266458	1266458
Detaile																	
200	1	Maintain Cover DA	1.00	LS									390,582			390,582	390,582
Detaile																	
LIST Cost Detail																	
1.0	UO&MCAP	O & M of Cap	2.41	LS	U								162,000			162,000	390,582
		UCC to Activity:			U								390,582			390,582	390,582
		Resource List UCC to Activity:			U								390,582			390,582	390,582
200	2	Quarterly Monitoring Well	6.48	EA									805,776			124,348	805,776
Detaile																	
LIST Cost Detail																	
1.0	UGWMONOM	GW Monitoring sampling	1.62	LS	U								497,700			497,700	805,776
		UCC to Activity:			U								124,348			124,348	805,776
		Resource List UCC to Activity:			U								124,348			124,348	805,776
200	3	CERCLA Reviews	1.00	LS									70,100			70,100	70,100
Detaile																	
LIST Cost Detail																	
1.0	USUMREPT	Summary Report PresentMth	1.00	LS	U								70,100			70,100	70,100
		UCC to Activity:			U								70,100			70,100	70,100
		Resource List UCC to Activity:			U								70,100			70,100	70,100

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ALTERNATIVE 2B, INDUSTRIAL WORKER

Job Description: Colonie 2B Industrial Wkr

Proposal Date:
Time:

From: ROY F. WESTON, INC.

Bid Item Number	Bid Item Description	Quantity	UM	Unit Price	Total Price
10	Mobilization & Site Preparation	1.0000	LS	0.00	**0.00**
20	Buried Drums	25.0000	EA	566.04	**14,151.00**
30	Divert Tributary	1.0000	LS	121,596.00	**121,596.00**
40	Dewater Excavation	1.0000	LS	77,123.90	**77,123.90**
50	Excavation	1.0000	LS	335,391.84	**335,391.84**
60	Characterization of Stockpiled Soils	1.0000	LS	90,450.00	**90,450.00**
70	Stabilization of Lead Soils	1.0000	LS	238,422.80	**238,422.80**
80	Confirmatory Sampling	1.0000	LS	65,540.00	**65,540.00**
90	Additional Excavation	1.0000	LS	4,677.48	**4,677.48**
100	Confirmatory Sampling AE	1.0000	LS	3,480.00	**3,480.00**
110	Transport & Dispose Offsite	1.0000	LS	6,416,290.80	**6,416,290.80**
120	Offsite Disposal VOC,SVOC	1.0000	LS	31,882.54	**31,882.54**
125	Groundwater Monitoring Wells	10.0000	EA	2,500.00	**25,000.00**
130	Site Restoration	1.0000	LS	380,981.70	**380,981.70**
140	Demobilize	1.0000	LS	20,360.00	**20,360.00**
	Direct Construction Cost			Subtotal	**7,825,348.06**
				Running Total	**7,825,348.06**
150	Indirect Construction Cost	1.0000	LS	1,268,154.00	**1,268,154.00**
	Indirect Construction Cost			Subtotal	**1,268,154.00**
				Running Total	**9,093,502.06**
200	Post Closure Activites (Present Worth)	1.0000	LS	875,876.30	**875,876.30**
				GRAND TOTAL	**9,969,378.36**

Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
10			Mobilization & Site Prep	1.00	LS													
Detaile																		
20			Buried Drums	25.00	EA		536.00				240.00	4,625.00		8,750.00			566	14,151
Detaile																		
20	1		Repackage Drums	25.00	EA		536.00				240.00	4,625.00					216	5,401
Detaile																		
LIST Cost Detail																		
	1.0	MOVERPAC	Overpac Drums	25.00	EA	U						185.00					185	4,625
			UCC to Activity:			U						185.00					185	4,625
			Resource List UCC to Activity:			U						185.00					185	4,625
CREW Cost Detail																		
	2.0 Days		12.5000 EA/Da		0.0800 Da/EA			388.00 Cost/Da										
	2.0 Shifts		12.5000 EA/Sh		0.0800 Sh/EA			388.00 Cost/Sh										
	16.0 Hours		1.5625 EA/Hr		0.6400 Hr/EA			48.50 Cost/Hr										
	1.0	LWSLAB	Site Laborer	16.00	HR	U	14.64										15	234
			UCC to Activity:			U	9.37										9	234
	1.0	LWSLOP	Equipment Operator	16.00	HR	U	18.86										19	302
			UCC to Activity:			U	12.07										12	302
	1.0	RBACKHOE	Backhoe JD 710	16.00	HR	U					15.00						15	240
			UCC to Activity:			U					9.60						10	240
			Resource List Hour Rate:			U	33.50				15.00						49	
			Resource List UCC to Activity:			U	21.44				9.60						31	776
20	2		Offsite Transport&Dispose	25.00	EA									8,750.00			350	8,750
Detaile																		
LIST Cost Detail																		
	1.0	UT&DRUM	T&D Envirocare UT Drums	25.00	EA	U								350.00			350	8,750
			UCC to Activity:			U								350.00			350	8,750
			Resource List UCC to Activity:			U								350.00			350	8,750
30			Divert Tributary	1.00	LS		4,556.00				16,440	58,600		42,000		121,596	121,596	
Detaile																		
30	1		Divert Pipeline	1,000.00	LF		4,020.00				16,200	58,000		42,000		120	120,220	
Detaile																		
LIST Cost Detail																		
	1.0	UHORZBOR	Horizontal Boring	100.00	LF	U								420.00			420	42,000
			UCC to Activity:			U								42.00			42	42,000
	1.0	M4'DPIPE	4'dia. pipe	1,000.00	LF	U						58.00					58	58,000
			UCC to Activity:			U						58.00					58	58,000
			Resource List UCC to Activity:			U						58.00		42.00			100	100,000
CREW Cost Detail																		
	Note:		Excavate & Backfill for new pipe.															
			Horizontal Bore under Railroad Tracks.															
	15.0 Days		66.6667 LF/Da		0.0150 Da/LF			1348.00 Cost/Da										
	15.0 Shifts		66.6667 LF/Sh		0.0150 Sh/LF			1348.00 Cost/Sh										
	120.0 Hours		8.3333 LF/Hr		0.1200 Hr/LF			168.50 Cost/Hr										
	1.0	LWSLAB	Site Laborer	120.00	HR	U	14.64										15	1,757
			UCC to Activity:			U	1.76										2	1,757
	1.0	LWSLOP	Equipment Operator	120.00	HR	U	18.86										19	2,263
			UCC to Activity:			U	2.26										2	2,263
	1.0	RBACKHOE	Backhoe JD 710	120.00	HR	U					15.00						15	1,800
			UCC to Activity:			U					1.80						2	1,800
	1.0	RCRANE	Crane W/Operator	120.00	HR	U					120.00						120	14,400
			UCC to Activity:			U					14.40						14	14,400
			Resource List Hour Rate:			U	33.50				135.00						169	
			Resource List UCC to Activity:			U	4.02				16.20						20	20,220
30	2		Plug & Abandon Ex.Culvert	2.00	EA		536.00				240.00	600.00					688	1,376
Detaile																		
LIST Cost Detail																		
	1.0	MPLUG8	48" Plugs	2.00	EA	U						300.00					300	600
			UCC to Activity:			U						300.00					300	600
			Resource List UCC to Activity:			U						300.00					300	600
CREW Cost Detail																		

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Code		Description	Quantity UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
	2.0 Days	1.0000 EA/Da	1.0000 Da/EA			388.00 Cost/Da										
	2.0 Shifts	1.0000 EA/Sh	1.0000 Sh/EA			388.00 Cost/Sh										
	16.0 Hours	0.1250 EA/Hr	8.0000 Hr/EA			48.50 Cost/Hr										
1.0	LWSLAB	Site Laborer	16.00 HR	U	14.64										15	234
			UCC to Activity:	U	117.12										117	234
1.0	LWSLOP	Equipment Operator	16.00 HR	U	18.86										19	302
			UCC to Activity:	U	150.88										151	302
1.0	RBACKHOE	Backhoe JD 710	16.00 HR	U					15.00						15	240
			UCC to Activity:	U					120.00						120	240
		Resource List Hour Rate:		U	33.50				15.00						49	
		Resource List UCC to Activity:		U	268.00				120.00						388	776
40		Dewater Excavation	1.00 LS		65,520							11,603			77,124	77,124
Detaile																
40	1	Operator 24hr/day	9.00 WK		45,360										5,040	45,360
Detaile																
LIST Cost Detail																
	Note:	Operate 24 hours/day														
	189.0 Days	0.0476 WK/Da	21.0000 Da/WK			240.00 Cost/Da										
	189.0 Shifts	0.0476 WK/Sh	21.0000 Sh/WK			240.00 Cost/Sh										
	1512.0 Hours	0.0060 WK/Hr	168.0000 Hr/WK			30.00 Cost/Hr										
1.0	LDWOPER	Dewatering Operator	1,512.00 HR	U	30.00										30	45,360
			UCC to Activity:	U	5,040.00										5,040	45,360
		Weighted Average Hour Rate:		U	30.00										30	
		Resource List UCC to Activity:		U	5,040.00										5,040	45,360
40	2	Change Carbon	2.00 MO									6,000.00			3,000	6,000
Detaile																
LIST Cost Detail																
	Note:	Change carbon monthly														
1.0	UCARCHNG	Carbon Changeouts	2.00 EA	U								3,000.00			3,000	6,000
			UCC to Activity:	U								3,000.00			3,000	6,000
		Resource List UCC to Activity:		U								3,000.00			3,000	6,000
40	3	Night Shift Supervisor	9.00 WK		20,160										2,240	20,160
Detaile																
LIST Cost Detail																
	Note:	Night shift supervisor 8 hr/day														
	63.0 Days	0.1429 WK/Da	7.0000 Da/WK			320.00 Cost/Da										
	63.0 Shifts	0.1429 WK/Sh	7.0000 Sh/WK			320.00 Cost/Sh										
	504.0 Hours	0.0179 WK/Hr	56.0000 Hr/WK			40.00 Cost/Hr										
1.0	LDWNOPER	Dewatering Operator Nite	504.00 HR	U	40.00										40	20,160
			UCC to Activity:	U	2,240.00										2,240	20,160
		Weighted Average Hour Rate:		U	40.00										40	
		Resource List UCC to Activity:		U	2,240.00										2,240	20,160
40	4	Electricity for Pumps	2.00 MO									4,523.90			2,262	4,524
Detaile																
LIST Cost Detail																
1.0	UELECTKW	Electricity	1,344.00 HR	U								3.37			3	4,524
			UCC to Activity:	U								2,261.95			2,262	4,524
		Resource List UCC to Activity:		U								2,261.95			2,262	4,524
40	5	Misc. Electric Charge	2.00 MO									480.00			240	480
Detaile																
LIST Cost Detail																
1.0	UMISCELE	Misc. Electric Charge	2.00 MO	U								240.00			240	480
			UCC to Activity:	U								240.00			240	480
		Resource List UCC to Activity:		U								240.00			240	480
40	6	Water Treatment Analysis	2.00 EA									600.00			300	600
Detaile																
LIST Cost Detail																
1.0	UWTRANAL	Water Treatment Analysis	2.00 EA	U								300.00			300	600
			UCC to Activity:	U								300.00			300	600
		Resource List UCC to Activity:		U								300.00			300	600

Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
50 Detaile		Excavation	1.00	LS		18,011				71,380			246,000			335,392	335,392
50 Detaile	1	Exc,Stockpile Soil/DA	25,402	CY		16,336				64,740						3	81,076
CREW Cost Detail																	
	39.0 Days	651.3333 CY/Da	0.0015 Da/CY			2078.88 Cost/Da											
	39.0 Shifts	651.3333 CY/Sh	0.0015 Sh/CY			2078.88 Cost/Sh											
	312.0 Hours	81.4167 CY/Hr	0.0123 Hr/CY			259.86 Cost/Hr											
	2.0 LWSLOP	Equipment Operator	624.00	HR	U	18.86										19	11,769
		UCC to Activity:			U	0.46										0	11,769
	2.0 REXC330	Excavator CAT 325B	624.00	HR	U					82.50						83	51,480
		UCC to Activity:			U					2.03						2	51,480
	1.0 LWSLAB	Site Laborer	312.00	HR	U	14.64										15	4,568
		UCC to Activity:			U	0.18										0	4,568
	1.0 RARTDUMP	Articulating Dump Truck	312.00	HR	U					42.50						43	13,260
		UCC to Activity:			U					0.52						1	13,260
		Resource List Hour Rate:			U	52.36				207.50						260	
		Resource List UCC to Activity:			U	0.64				2.55						3	81,076
50 Detaile	2	Exc,Stockpile Soil/EA	2,776.00	CY		1,675.52				6,640.00						3	8,316
CREW Cost Detail																	
	4.0 Days	694.0000 CY/Da	0.0014 Da/CY			2078.88 Cost/Da											
	4.0 Shifts	694.0000 CY/Sh	0.0014 Sh/CY			2078.88 Cost/Sh											
	32.0 Hours	86.7500 CY/Hr	0.0115 Hr/CY			259.86 Cost/Hr											
	2.0 LWSLOP	Equipment Operator	64.00	HR	U	18.86										19	1,207
		UCC to Activity:			U	0.43										0	1,207
	2.0 REXC330	Excavator CAT 325B	64.00	HR	U					82.50						83	5,280
		UCC to Activity:			U					1.90						2	5,280
	1.0 LWSLAB	Site Laborer	32.00	HR	U	14.64										15	468
		UCC to Activity:			U	0.17										0	468
	1.0 RARTDUMP	Articulating Dump Truck	32.00	HR	U					42.50						43	1,360
		UCC to Activity:			U					0.49						0	1,360
		Resource List Hour Rate:			U	52.36				207.50						260	
		Resource List UCC to Activity:			U	0.60				2.39						3	8,316
50 Detaile	7	Install Cribbing/Walers	6,000.00	SF									246,000			41	246,000
LIST Cost Detail																	
	1.0 UCRIBWAL	Install Cribbing/Walers	6,000.00	SF	U								41.00			41	246,000
		UCC to Activity:			U								41.00			41	246,000
		Resource List UCC to Activity:			U								41.00			41	246,000
60 Detaile		Characterization	1.00	LS									90,450			90,450	90,450
60 Detaile	1	Rad Analysis Rad Soils	135.00	EA									54,000			400	54,000
LIST Cost Detail																	
	1.0 URADANAL	Rad Analysis	135.00	EA	U								400.00			400	54,000
		UCC to Activity:			U								400.00			400	54,000
		Resource List UCC to Activity:			U								400.00			400	54,000
60 Detaile	2	TCLP Analysis Lead Soil	135.00	EA									36,450			270	36,450
LIST Cost Detail																	
	1.0 UTCLPAN	TCLP Analysis	135.00	EA	U								270.00			270	36,450
		UCC to Activity:			U								270.00			270	36,450
		Resource List UCC to Activity:			U								270.00			270	36,450
70 Detaile		Stabilization	1.00	LS		9,215.36				107,402	60,248		61,556			238,423	238,423
70 Detaile	1	Transport Soil Stockpile	11,158	CY		4,188.80				6,800.00						1	10,989
CREW Cost Detail																	

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Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
		10.0 Days	1115.800 CY/Da	0.0009	Da/CY			1098.88 Cost/Da										
		10.0 Shifts	1115.800 CY/Sh	0.0009	Sh/CY			1098.88 Cost/Sh										
		80.0 Hours	139.4750 CY/Hr	0.0072	Hr/CY			137.36 Cost/Hr										
	1.0	LWSLAB	Site Laborer	80.00	HR	U	14.64										15	1,171
			UCC to Activity:			U	0.10										0	1,171
	2.0	LWSLOP	Equipment Operator	160.00	HR	U	18.86										19	3,018
			UCC to Activity:			U	0.27										0	3,018
	2.0	RARTDUMP	Articulating Dump Truck	160.00	HR	U					42.50						43	6,800
			UCC to Activity:			U					0.61						1	6,800
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.38				0.61						1	10,989
70	2		Pug Mill Process	11,158	CY						92,442	60,248		48,326			18	201,017
Detaile																		
LIST Cost Detail																		
	1.0	UPUGMOB	Mob/Maintain Pug Mill	0.78	LS	U								18,400			18,400	14,378
			UCC to Activity:			U								1.29			1	14,378
	1.0	UPUGRENT	Pug Mill Rental	3.91	MO	U					9,660.00						9,660	37,743
			UCC to Activity:			U					3.38						3	37,743
	1.0	UPHOSACD	Phosphoric Acid,pH agent	401.65	TN	U						150.00					150	60,248
			UCC to Activity:			U						5.40					5	60,248
	1.0	UACIDPMP	Acid Pump Rental	3.91	MO	U					10,000						10,000	39,071
			UCC to Activity:			U					3.50						4	39,071
	1.0	USTORAGE	Storage of acid,pH red.ag	0.78	LS	U								10,000			10,000	7,814
			UCC to Activity:			U								0.70			1	7,814
	1.0	UPWRPUGM	Power for Pug Mill	0.78	LS	U								15,000			15,000	11,721
			UCC to Activity:			U								1.05			1	11,721
	1.0	UANCEQUP	Ancillary Equip.for Pug	3.91	MO	U					4,000.00						4,000	15,629
			UCC to Activity:			U					1.40						1	15,629
	1.0	ULOADSOL	Load soil into Pug Mill	11,158	CY	U								1.22			1	13,613
			UCC to Activity:			U								1.22			1	13,613
	1.0	ULOADPHS	Load Phosphoric in Pug	261.39	CY	U								1.53			2	400
			UCC to Activity:			U								0.04			0	400
	1.0	ULODPH	Load pH Reduct in Pug	261.39	CY	U								1.53			2	400
			UCC to Activity:			U								0.04			0	400
			Resource List UCC to Activity:			U					8.28	5.40		4.33			18	201,017
70	3		Confirmation Testing	49.00	EA									13,230			270	13,230
Detaile																		
LIST Cost Detail																		
	1.0	UTCLPAN	TCLP Analysis	49.00	EA	U								270.00			270	13,230
			UCC to Activity:			U								270.00			270	13,230
			Resource List UCC to Activity:			U								270.00			270	13,230
70	4		Transport to Stockpile	12,274	CY		5,026.56				8,160.00						1	13,187
Detaile																		
CREW Cost Detail																		
		12.0 Days	1022.833 CY/Da	0.0010	Da/CY			1098.88 Cost/Da										
		12.0 Shifts	1022.833 CY/Sh	0.0010	Sh/CY			1098.88 Cost/Sh										
		96.0 Hours	127.8542 CY/Hr	0.0078	Hr/CY			137.36 Cost/Hr										
	1.0	LWSLAB	Site Laborer	96.00	HR	U	14.64										15	1,405
			UCC to Activity:			U	0.11										0	1,405
	2.0	LWSLOP	Equipment Operator	192.00	HR	U	18.86										19	3,621
			UCC to Activity:			U	0.30										0	3,621
	2.0	RARTDUMP	Articulating Dump Truck	192.00	HR	U					42.50						43	8,160
			UCC to Activity:			U					0.66						1	8,160
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.41				0.66						1	13,187
80			Confirmatory Sampling	1.00	LS									65,540			65,540	65,540
Detaile																		
80	1		Confirmatory Sampling	113.00	EA									65,540			580	65,540
Detaile																		
LIST Cost Detail																		
	1.0	URADANAL	Rad Analysis	113.00	EA	U								400.00			400	45,200
			UCC to Activity:			U								400.00			400	45,200
	1.0	UMETLANL	Metals Analysis	113.00	EA	U								180.00			180	20,340
			UCC to Activity:			U								180.00			180	20,340
			Resource List UCC to Activity:			U								580.00			580	65,540

Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
90			Additional Excavation	1.00	LS		942.48				3,735.00						4,677	4,677
Detaile																		
90	1		Exc,Stockpile Soil/DA	1,270.00	CY		837.76				3,320.00						3	4,158
Detaile																		
CREW Cost Detail																		
	2.0 Days		635.0000 CY/Da	0.0016 Da/CY			2078.88 Cost/Da											
	2.0 Shifts		635.0000 CY/Sh	0.0016 Sh/CY			2078.88 Cost/Sh											
	16.0 Hours		79.3750 CY/Hr	0.0126 Hr/CY			259.86 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	32.00	HR	U	18.86										19	604
				UCC to Activity:		U	0.48										0	604
	2.0	REXC330	Excavator CAT 325B	32.00	HR	U					82.50						83	2,640
				UCC to Activity:		U					2.08						2	2,640
	1.0	LWSLAB	Site Laborer	16.00	HR	U	14.64										15	234
				UCC to Activity:		U	0.18										0	234
	1.0	RARTDUMP	Articulating Dump Truck	16.00	HR	U					42.50						43	680
				UCC to Activity:		U					0.54						1	680
			Resource List Hour Rate:			U	52.36				207.50						260	
			Resource List UCC to Activity:			U	0.66				2.61						3	4,158
90	2		Exc,Stockpile Soil/EA	139.00	CY		104.72				415.00						4	520
Detaile																		
CREW Cost Detail																		
	0.3 Days		556.0000 CY/Da	0.0018 Da/CY			2078.88 Cost/Da											
	0.3 Shifts		556.0000 CY/Sh	0.0018 Sh/CY			2078.88 Cost/Sh											
	2.0 Hours		69.5000 CY/Hr	0.0144 Hr/CY			259.86 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	4.00	HR	U	18.86										19	75
				UCC to Activity:		U	0.54										1	75
	1.0	LWSLAB	Site Laborer	2.00	HR	U	14.64										15	29
				UCC to Activity:		U	0.21										0	29
	2.0	REXC330	Excavator CAT 325B	4.00	HR	U					82.50						83	330
				UCC to Activity:		U					2.37						2	330
	1.0	RARTDUMP	Articulating Dump Truck	2.00	HR	U					42.50						43	85
				UCC to Activity:		U					0.61						1	85
			Resource List Hour Rate:			U	52.36				207.50						260	
			Resource List UCC to Activity:			U	0.75				2.99						4	520
100			Confirmatory Sampling AE	1.00	LS									3,480.00			3,480	3,480
Detaile																		
100	1		Confirmatory Sampling AE	6.00	EA									3,480.00			580	3,480
Detaile																		
LIST Cost Detail																		
	1.0	URADANAL	Rad Analysis	6.00	EA	U								400.00			400	2,400
				UCC to Activity:		U								400.00			400	2,400
	1.0	UMETLANL	Metals Analysis	6.00	EA	U								180.00			180	1,080
				UCC to Activity:		U								180.00			180	1,080
			Resource List UCC to Activity:			U								580.00			580	3,480
110			T & D Offsi	1.00	LS		14,660				23,800			6377830			6416291	6416291
Detaile																		
110	1		Transport from Stockpile	36,620	CY		14,660				23,800						1	38,461
Detaile																		
CREW Cost Detail																		
	35.0 Days		1046.286 CY/Da	0.0010 Da/CY			1098.88 Cost/Da											
	35.0 Shifts		1046.286 CY/Sh	0.0010 Sh/CY			1098.88 Cost/Sh											
	280.0 Hours		130.7857 CY/Hr	0.0076 Hr/CY			137.36 Cost/Hr											
	1.0	LWSLAB	Site Laborer	280.00	HR	U	14.64										15	4,099
				UCC to Activity:		U	0.11										0	4,099
	2.0	LWSLOP	Equipment Operator	560.00	HR	U	18.86										19	10,562
				UCC to Activity:		U	0.29										0	10,562
	2.0	RARTDUMP	Articulating Dump Truck	560.00	HR	U					42.50						43	23,800
				UCC to Activity:		U					0.65						1	23,800
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.40				0.65						1	38,461

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ROY F. WESTON, INC.
COL2BINW (Colonie 2B Industrial Wkr)
Abbreviated Estimator's Report

Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
110	2		T & D Subtitle C (LLRW)	1,250.00	CY									311,875			250	311,875
Detaile																		
LIST Cost Detail																		
	1.0	UDISPEUT	Disposal Subtitle C(LLRW)	1,250.00	CY	U								149.50			150	186,875
				UCC to Activity:		U								149.50			150	186,875
	1.0	UTRANSPT	Transport by Rail	1,250.00	CY	U								100.00			100	125,000
				UCC to Activity:		U								100.00			100	125,000
			Resource List UCC to Activity:			U								249.50			250	311,875
110	3		T & D Subtitle C (LARM)	35,370	CY									6065955			172	6065955
Detaile																		
LIST Cost Detail																		
	1.0	UDISENSF	Disposal Subtitle C(LARM)	35,370	CY	U								71.50			72	2528955
				UCC to Activity:		U								71.50			72	2528955
	1.0	UTRANSPT	Transport by Rail	35,370	CY	U								100.00			100	3537000
				UCC to Activity:		U								100.00			100	3537000
			Resource List UCC to Activity:			U								171.50			172	6065955
110	4		T & D Soils Subtitle D LF	1.00	CY									0.00			0	0
Detaile																		
LIST Cost Detail																		
		Note:	1 cy = 1.2 tons															
	1.0	UT&DSUBD	T & D Subtitle D Landfill	0.00	TN	U								45.00			45	0
				UCC to Activity:		U								0.00			0	0
			Resource List UCC to Activity:			U								0.00			0	0
120			Offsite Disposal VOC,SVOC	1.00	LS		60.05				97.49			31,725		31,883		31,883
Detaile																		
120	1		Characterization Sampling	10.00	EA									6,000.00			600	6,000
Detaile																		
LIST Cost Detail																		
	1.0	UVOCANAL	VOC Analysis	10.00	EA	U								225.00			225	2,250
				UCC to Activity:		U								225.00			225	2,250
	1.0	USVOCANL	SVOC Analysis	10.00	EA	U								375.00			375	3,750
				UCC to Activity:		U								375.00			375	3,750
			Resource List UCC to Activity:			U								600.00			600	6,000
120	2		T & D Soils	150.00	TN									25,725			172	25,725
Detaile																		
LIST Cost Detail																		
	1.0	UT&DVOC	T & D VOC Soils	150.00	TN	U								171.50			172	25,725
				UCC to Activity:		U								171.50			172	25,725
			Resource List UCC to Activity:			U								171.50			172	25,725
120	3		Transport to Stockpile	150.00	CY		60.05				97.49						1	158
Detaile																		
CREW Cost Detail																		
		0.1 Days	1046.286 CY/Da		0.0010 Da/CY		1098.88 Cost/Da											
		0.1 Shifts	1046.286 CY/Sh		0.0010 Sh/CY		1098.88 Cost/Sh											
		1.1 Hours	130.7857 CY/Hr		0.0076 Hr/CY		137.36 Cost/Hr											
	1.0	LWSLAB	Site Laborer	1.15	HR	U	14.64										15	17
				UCC to Activity:		U	0.11										0	17
	2.0	LWSLOP	Equipment Operator	2.29	HR	U	18.86										19	43
				UCC to Activity:		U	0.29										0	43
	2.0	RARTDUMP	Articulating Dump Truck	2.29	HR	U					42.50						43	97
				UCC to Activity:		U					0.65						1	97
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.40				0.65						1	158
125			GW Monitoring Wells	10.00	EA									25,000			2,500	25,000
Detaile																		

Code		Description	Quantity UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
125	1	GW Monitoring Wells	10.00 EA									25,000			2,500	25,000
Detaile																
LIST Cost Detail																
	1.0 UGWELLS	GW Monitoring Wells	10.00 EA	U								2,500.00			2,500	25,000
		UCC to Activity:		U								2,500.00			2,500	25,000
		Resource List UCC to Activity:		U								2,500.00			2,500	25,000
130		Site Restoration	1.00 LS		16,755				60,000	292,914		11,312			380,982	380,982
Detaile																
130	1	Fill Material	32,546 CY							292,914					9	292,914
Detaile																
LIST Cost Detail																
	1.0 MFILLMTL	Fill Material	32,546 CY	U						9.00					9	292,914
		UCC to Activity:		U						9.00					9	292,914
		Resource List UCC to Activity:		U						9.00					9	292,914
130	2	Spread,Compact,Grade Fill	32,546 CY		16,755				60,000						2	76,755
Detaile																
CREW Cost Detail																
	40.0 Days	813.6500 CY/Da	0.0012 Da/CY		1918.88 Cost/Da											
	40.0 Shifts	813.6500 CY/Sh	0.0012 Sh/CY		1918.88 Cost/Sh											
	320.0 Hours	101.7063 CY/Hr	0.0098 Hr/CY		239.86 Cost/Hr											
	2.0 LWSLOP	Equipment Operator	640.00 HR	U	18.86										19	12,070
		UCC to Activity:		U	0.37										0	12,070
	1.0 LWSLAB	Site Laborer	320.00 HR	U	14.64										15	4,685
		UCC to Activity:		U	0.14										0	4,685
	2.0 RCOMPACT	Compactor CAT CS323C	640.00 HR	U					93.75						94	60,000
		UCC to Activity:		U					1.84						2	60,000
		Resource List Hour Rate:		U	52.36				187.50						240	
		Resource List UCC to Activity:		U	0.51				1.84						2	76,755
130	3	Seed Area	12.50 AC									11,312			905	11,313
Detaile																
LIST Cost Detail																
	1.0 USEED	Seeding	12.50 AC	U								905.00			905	11,313
		UCC to Activity:		U								905.00			905	11,313
		Resource List UCC to Activity:		U								905.00			905	11,313
140		Demobilize	1.00 LS		5,360.00							15,000			20,360	20,360
Detaile																
LIST Cost Detail																
	1.0 UDEMOBTR	Demob Trailers	6.00 EA	U								500.00			500	3,000
		UCC to Activity:		U								3,000.00			3,000	3,000
	1.0 UDEMOBEQ	Demob Equipment	10.00 EA	U								300.00			300	3,000
		UCC to Activity:		U								3,000.00			3,000	3,000
	1.0 UDISMUTL	Dismantle Utilities	1.00 LS	U								6,000.00			6,000	6,000
		UCC to Activity:		U								6,000.00			6,000	6,000
	1.0 UDISPOSL	Disposal of Debris	1.00 LS	U								3,000.00			3,000	3,000
		UCC to Activity:		U								3,000.00			3,000	3,000
		Resource List UCC to Activity:		U								15,000			15,000	15,000
CREW Cost Detail																
	10.0 Days	0.1000 LS/Da	10.0000 Da/LS		536.00 Cost/Da											
	10.0 Shifts	0.1000 LS/Sh	10.0000 Sh/LS		536.00 Cost/Sh											
	80.0 Hours	0.0125 LS/Hr	80.0000 Hr/LS		67.00 Cost/Hr											
	2.0 LWSLOP	Equipment Operator	160.00 HR	U	18.86										19	3,018
		UCC to Activity:		U	3,017.60										3,018	3,018
	2.0 LWSLAB	Site Laborer	160.00 HR	U	14.64										15	2,342
		UCC to Activity:		U	2,342.40										2,342	2,342
		Resource List Hour Rate:		U	67.00										67	
		Resource List UCC to Activity:		U	5,360.00										5,360	5,360
150		Indirect Construct Cost	1.00 LS									1268154			1268154	1268154
Detaile																

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Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
150	1	Permit & Legal (5%)	1.00	LS									70,453			70,453	70,453
Detaile																	
LIST Cost Detail																	
1.0	UPERMTLG	Permit & Legal 5%	1.00	LS	U								70,453			70,453	70,453
		UCC to Activity:			U								70,453			70,453	70,453
		Resource List UCC to Activity:			U								70,453			70,453	70,453
150	2	Health & Safety (10%)	1.00	LS									140,906			140,906	140,906
Detaile																	
LIST Cost Detail																	
1.0	UH&S	Health & Safety 10%	1.00	LS	U								140,906			140,906	140,906
		UCC to Activity:			U								140,906			140,906	140,906
		Resource List UCC to Activity:			U								140,906			140,906	140,906
150	3	Construct Management(10%)	1.00	LS									140,906			140,906	140,906
Detaile																	
LIST Cost Detail																	
1.0	UCONMGMT	Construct Management 10%	1.00	LS	U								140,906			140,906	140,906
		UCC to Activity:			U								140,906			140,906	140,906
		Resource List UCC to Activity:			U								140,906			140,906	140,906
150	4	QA & Oversight (10%)	1.00	LS									140,906			140,906	140,906
Detaile																	
LIST Cost Detail																	
1.0	UQA,OVST	QA & Oversight 10%	1.00	LS	U								140,906			140,906	140,906
		UCC to Activity:			U								140,906			140,906	140,906
		Resource List UCC to Activity:			U								140,906			140,906	140,906
150	5	Bid & Scope Conting.(10%)	1.00	LS									140,906			140,906	140,906
Detaile																	
LIST Cost Detail																	
1.0	UBIDSCPE	Bid & Scope Conting. 10%	1.00	LS	U								140,906			140,906	140,906
		UCC to Activity:			U								140,906			140,906	140,906
		Resource List UCC to Activity:			U								140,906			140,906	140,906
150	6	Cert.Consruct.Report (5%)	1.00	LS									70,453			70,453	70,453
Detaile																	
LIST Cost Detail																	
1.0	UCERTCRP	Cert.Construct Report 5%	1.00	LS	U								70,453			70,453	70,453
		UCC to Activity:			U								70,453			70,453	70,453
		Resource List UCC to Activity:			U								70,453			70,453	70,453
150	7	Surveying/GPS (10%)	1.00	LS									140,906			140,906	140,906
Detaile																	
LIST Cost Detail																	
1.0	USURVEYG	Survey/GPS 10%	1.00	LS	U								140,906			140,906	140,906
		UCC to Activity:			U								140,906			140,906	140,906
		Resource List UCC to Activity:			U								140,906			140,906	140,906
150	8	Office Proj. Mgmt (10%)	1.00	LS									140,906			140,906	140,906
Detaile																	
LIST Cost Detail																	
1.0	UPROJMGM	Office Project Manage 10%	1.00	LS	U								140,906			140,906	140,906
		UCC to Activity:			U								140,906			140,906	140,906
		Resource List UCC to Activity:			U								140,906			140,906	140,906
150	9	Miscellaneous (ODCs) (5%)	1.00	LS									70,453			70,453	70,453
Detaile																	
LIST Cost Detail																	
1.0	UMISC	Miscellanous ODC's 5%	1.00	LS	U								70,453			70,453	70,453
		UCC to Activity:			U								70,453			70,453	70,453
		Resource List UCC to Activity:			U								70,453			70,453	70,453

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Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
150	10	Health Physics Support-5%	1.00	LS									70,453			70,453	70,453
Detaile																	
LIST Cost Detail																	
1.0	UHEALPHY	Health Physics Sup. 5%	1.00	LS	U								70,453			70,453	70,453
		UCC to Activity:			U								70,453			70,453	70,453
		Resource List UCC to Activity:			U								70,453			70,453	70,453
150	11	Gen.Contingency (10%)	1.00	LS									140,906			140,906	140,906
Detaile																	
LIST Cost Detail																	
1.0	UGENCONT	General Contingency 10%	1.00	LS	U								140,906			140,906	140,906
		UCC to Activity:			U								140,906			140,906	140,906
		Resource List UCC to Activity:			U								140,906			140,906	140,906
200		Post Closure Activity(PW)	1.00	LS									875,876			875,876	875,876
Detaile																	
200	1	Quarterly Monitoring Well	4.00	EA									805,776			201,444	805,776
Detaile																	
LIST Cost Detail																	
1.0	UGWMONOM	GW Monitoring sampling	1.62	LS	U								497,700			497,700	805,776
		UCC to Activity:			U								201,444			201,444	805,776
		Resource List UCC to Activity:			U								201,444			201,444	805,776
200	2	CERCLA Reviews	1.00	LS									70,100			70,100	70,100
Detaile																	
LIST Cost Detail																	
1.0	USUMREPT	Summary Report PresentWth	1.00	LS	U								70,100			70,100	70,100
		UCC to Activity:			U								70,100			70,100	70,100
		Resource List UCC to Activity:			U								70,100			70,100	70,100

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ALTERNATIVE 3B, INDUSTRIAL WORKER

Job Description: Colonie 3B Industrial Wkr

Proposal Date:
Time:

From: ROY F. WESTON, INC.

Bid Item Number	Bid Item Description	Quantity	UM	Unit Price	Total Price
10	Mobilization & Site Preparation	1.0000	LS	0.00	**0.00**
20	Buried Drums	25.0000	EA	566.04	**14,151.00**
30	Divert Tributary	1.0000	LS	121,596.00	**121,596.00**
40	Dewater Excavation	1.0000	LS	77,123.90	**77,123.90**
50	Excavation	1.0000	LS	335,391.84	**335,391.84**
60	Characterization of Stockpiled Soils	1.0000	LS	90,450.00	**90,450.00**
70	Stabilization of Lead Soils	1.0000	LS	238,422.80	**238,422.80**
80	Confirmatory Sampling	1.0000	LS	65,540.00	**65,540.00**
90	Additional Excavation	1.0000	LS	4,677.48	**4,677.48**
100	Confirmatory Sampling AE	1.0000	LS	3,480.00	**3,480.00**
110	Onsite Disposal of Soil DA	1.0000	LS	75,460.64	**75,460.64**
120	Construct Composite Cover over DA	1.0000	LS	247,624.89	**247,624.89**
130	Transport & Dispose Offsite	1.0000	LS	859,690.80	**859,690.80**
140	Offsite Disposal VOC,SVOC	1.0000	LS	31,887.80	**31,887.80**
150	Groundwater Monitoring Wells	10.0000	EA	2,500.00	**25,000.00**
160	Site Restoration	1.0000	LS	379,171.70	**379,171.70**
170	Demobilization	1.0000	LS	20,360.00	**20,360.00**
	Direct Construction Cost			Subtotal Running Total	**2,590,028.85** **2,590,028.85**
190	Indirect Construction Cost	1.0000	LS	1,557,306.00	**1,557,306.00**
	Indirect Construction Cost			Subtotal Running Total	**1,557,306.00** **4,147,334.85**
200	Post Closure Activites (Present Worth)	1.0000	LS	1,266,458.31	**1,266,458.31**
				GRAND TOTAL	**5,413,793.16**

Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
10			Mobilization & Site Prep	1.00	LS													
Detaile																		
20			Buried Drums	25.00	EA		536.00				240.00	4,625.00		8,750.00			566	14,151
Detaile																		
20	1		Repackage Drums	25.00	EA		536.00				240.00	4,625.00					216	5,401
Detaile																		
LIST Cost Detail																		
	1.0	MOVERPAC	Overpac Drums	25.00	EA	U						185.00					185	4,625
			UCC to Activity:			U						185.00					185	4,625
			Resource List UCC to Activity:			U						185.00					185	4,625
CREW Cost Detail																		
	2.0 Days		12.5000 EA/Da	0.0800 Da/EA			388.00 Cost/Da											
	2.0 Shifts		12.5000 EA/Sh	0.0800 Sh/EA			388.00 Cost/Sh											
	16.0 Hours		1.5625 EA/Hr	0.6400 Hr/EA			48.50 Cost/Hr											
	1.0	LWSLAB	Site Laborer	16.00	HR	U	14.64										15	234
			UCC to Activity:			U	9.37										9	234
	1.0	LWSLOP	Equipment Operator	16.00	HR	U	18.86										19	302
			UCC to Activity:			U	12.07										12	302
	1.0	RBACKHOE	Backhoe JD 710	16.00	HR	U					15.00						15	240
			UCC to Activity:			U					9.60						10	240
			Resource List Hour Rate:			U	33.50				15.00						49	
			Resource List UCC to Activity:			U	21.44				9.60						31	776
20	2		Offsite Trans&/Disposal	25.00	EA									8,750.00			350	8,750
Detaile																		
LIST Cost Detail																		
	1.0	UT&DRUM	T&D Envirocare UT Drums	25.00	EA	U								350.00			350	8,750
			UCC to Activity:			U								350.00			350	8,750
			Resource List UCC to Activity:			U								350.00			350	8,750
30			Divert Tributary	1.00	LS		4,556.00				16,440	58,600		42,000		121,596	121,596	
Detaile																		
30	1		Divert Pipeline	1,000.00	LF		4,020.00				16,200	58,000		42,000			120	120,220
Detaile																		
LIST Cost Detail																		
	1.0	UHORZBOR	Horizontal Boring	100.00	LF	U								420.00			420	42,000
			UCC to Activity:			U								42.00			42	42,000
	1.0	M4'DPIPE	4'dia. pipe	1,000.00	LF	U						58.00					58	58,000
			UCC to Activity:			U						58.00					58	58,000
			Resource List UCC to Activity:			U						58.00		42.00			100	100,000
CREW Cost Detail																		
	Note:		Excavate & Backfill for new pipe. Horizontal Bore under Railroad Tracks.															
	15.0 Days		66.6667 LF/Da	0.0150 Da/LF			1348.00 Cost/Da											
	15.0 Shifts		66.6667 LF/Sh	0.0150 Sh/LF			1348.00 Cost/Sh											
	120.0 Hours		8.3333 LF/Hr	0.1200 Hr/LF			168.50 Cost/Hr											
	1.0	LWSLAB	Site Laborer	120.00	HR	U	14.64										15	1,757
			UCC to Activity:			U	1.76										2	1,757
	1.0	LWSLOP	Equipment Operator	120.00	HR	U	18.86										19	2,263
			UCC to Activity:			U	2.26										2	2,263
	1.0	RBACKHOE	Backhoe JD 710	120.00	HR	U					15.00						15	1,800
			UCC to Activity:			U					1.80						2	1,800
	1.0	RCRANE	Crane W/Operator	120.00	HR	U					120.00						120	14,400
			UCC to Activity:			U					14.40						14	14,400
			Resource List Hour Rate:			U	33.50				135.00						169	
			Resource List UCC to Activity:			U	4.02				16.20						20	20,220
30	2		Plug & Abandon Ex.Culvert	2.00	EA		536.00				240.00	600.00					688	1,376
Detaile																		
LIST Cost Detail																		
	1.0	MPLUGS	48" Plugs	2.00	EA	U						300.00					300	600
			UCC to Activity:			U						300.00					300	600
			Resource List UCC to Activity:			U						300.00					300	600
CREW Cost Detail																		

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Code		Description	Quantity UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
	2.0 Days	1.0000 EA/Da	1.0000 Da/EA			388.00 Cost/Da										
	2.0 Shifts	1.0000 EA/Sh	1.0000 Sh/EA			388.00 Cost/Sh										
	16.0 Hours	0.1250 EA/Hr	8.0000 Hr/EA			48.50 Cost/Hr										
1.0	LWSLAB	Site Laborer	16.00 HR	U	14.64										15	234
		UCC to Activity:		U	117.12										117	234
1.0	LWSLOP	Equipment Operator	16.00 HR	U	18.86										19	302
		UCC to Activity:		U	150.88										151	302
1.0	RBACKHOE	Backhoe JD 710	16.00 HR	U					15.00						15	240
		UCC to Activity:		U					120.00						120	240
		Resource List Hour Rate:		U	33.50				15.00						49	
		Resource List UCC to Activity:		U	268.00				120.00						388	776
40		Dewater Excavation	1.00 LS		65,520							11,603			77,124	77,124
Detaile																
40	1	Operator 24hr/day	9.00 WK		45,360										5,040	45,360
Detaile																
LIST Cost Detail																
	Note:	Operate 24 hous/day														
	189.0 Days	0.0476 WK/Da	21.0000 Da/WK			240.00 Cost/Da										
	189.0 Shifts	0.0476 WK/Sh	21.0000 Sh/WK			240.00 Cost/Sh										
	1512.0 Hours	0.0060 WK/Hr	168.0000 Hr/WK			30.00 Cost/Hr										
1.0	LDWOPER	Dewatering Operator	1,512.00 HR	U	30.00										30	45,360
		UCC to Activity:		U	5,040.00										5,040	45,360
		Weighted Average Hour Rate:		U	30.00										30	
		Resource List UCC to Activity:		U	5,040.00										5,040	45,360
40	2	Change Carbon	2.00 MO									6,000.00			3,000	6,000
Detaile																
LIST Cost Detail																
	Note:	Change carbon monthly														
1.0	UCARCHNG	Carbon Changeouts	2.00 EA	U								3,000.00			3,000	6,000
		UCC to Activity:		U								3,000.00			3,000	6,000
		Resource List UCC to Activity:		U								3,000.00			3,000	6,000
40	3	Night Shift Supervisor	9.00 WK		20,160										2,240	20,160
Detaile																
LIST Cost Detail																
	Note:	Night shift supervisor 8 hr/day														
	63.0 Days	0.1429 WK/Da	7.0000 Da/WK			320.00 Cost/Da										
	63.0 Shifts	0.1429 WK/Sh	7.0000 Sh/WK			320.00 Cost/Sh										
	504.0 Hours	0.0179 WK/Hr	56.0000 Hr/WK			40.00 Cost/Hr										
1.0	LDWNOPER	Dewatering Operator Nite	504.00 HR	U	40.00										40	20,160
		UCC to Activity:		U	2,240.00										2,240	20,160
		Weighted Average Hour Rate:		U	40.00										40	
		Resource List UCC to Activity:		U	2,240.00										2,240	20,160
40	4	Electricity for Pumps	2.00 MO									4,523.90			2,262	4,524
Detaile																
LIST Cost Detail																
1.0	UELECTKW	Electricity	1,344.00 HR	U								3.37			3	4,524
		UCC to Activity:		U								2,261.95			2,262	4,524
		Resource List UCC to Activity:		U								2,261.95			2,262	4,524
40	5	Misc. Electric Charge	2.00 MO									480.00			240	480
Detaile																
LIST Cost Detail																
1.0	UMISCELE	Misc. Electric Charge	2.00 MO	U								240.00			240	480
		UCC to Activity:		U								240.00			240	480
		Resource List UCC to Activity:		U								240.00			240	480
40	6	Water Treatment Analysis	2.00 EA									600.00			300	600
Detaile																
LIST Cost Detail																
1.0	UWTRANAL	Water Treatment Analysis	2.00 EA	U								300.00			300	600
		UCC to Activity:		U								300.00			300	600
		Resource List UCC to Activity:		U								300.00			300	600

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Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
50		Excavation	1.00	LS		18,011				71,380			246,000			335,392	335,392
Detaile																	
50	1	Exc,Stockpile Soil/DA	25,402	CY		16,336				64,740						3	81,076
Detaile																	
CREW Cost Detail																	
	39.0 Days	651.3333 CY/Da	0.0015 Da/CY			2078.88 Cost/Da											
	39.0 Shifts	651.3333 CY/Sh	0.0015 Sh/CY			2078.88 Cost/Sh											
	312.0 Hours	81.4167 CY/Hr	0.0123 Hr/CY			259.86 Cost/Hr											
	2.0 LWSLOP	Equipment Operator	624.00	HR	U	18.86										19	11,769
			UCC to Activity:		U	0.46										0	11,769
	2.0 REXC330	Excavator CAT 325B	624.00	HR	U					82.50						83	51,480
			UCC to Activity:		U					2.03						2	51,480
	1.0 LWSLAB	Site Laborer	312.00	HR	U	14.64										15	4,568
			UCC to Activity:		U	0.18										0	4,568
	1.0 RARTDUMP	Articulating Dump Truck	312.00	HR	U					42.50						43	13,260
			UCC to Activity:		U					0.52						1	13,260
		Resource List Hour Rate:			U	52.36				207.50						260	
		Resource List UCC to Activity:			U	0.64				2.55						3	81,076
50	2	Exc,Stockpile Soil/EA	2,776.00	CY		1,675.52				6,640.00						3	8,316
Detaile																	
CREW Cost Detail																	
	4.0 Days	694.0000 CY/Da	0.0014 Da/CY			2078.88 Cost/Da											
	4.0 Shifts	694.0000 CY/Sh	0.0014 Sh/CY			2078.88 Cost/Sh											
	32.0 Hours	86.7500 CY/Hr	0.0115 Hr/CY			259.86 Cost/Hr											
	2.0 LWSLOP	Equipment Operator	64.00	HR	U	18.86										19	1,207
			UCC to Activity:		U	0.43										0	1,207
	2.0 REXC330	Excavator CAT 325B	64.00	HR	U					82.50						83	5,280
			UCC to Activity:		U					1.90						2	5,280
	1.0 LWSLAB	Site Laborer	32.00	HR	U	14.64										15	468
			UCC to Activity:		U	0.17										0	468
	1.0 RARTDUMP	Articulating Dump Truck	32.00	HR	U					42.50						43	1,360
			UCC to Activity:		U					0.49						0	1,360
		Resource List Hour Rate:			U	52.36				207.50						260	
		Resource List UCC to Activity:			U	0.60				2.39						3	8,316
50	7	Install Cribbing/Walers	6,000.00	SF									246,000			41	246,000
Detaile																	
LIST Cost Detail																	
	1.0 UCRIBWAL	Install Cribbing/Walers	6,000.00	SF	U								41.00			41	246,000
			UCC to Activity:		U								41.00			41	246,000
		Resource List UCC to Activity:			U								41.00			41	246,000
60		Characterization	1.00	LS									90,450			90,450	90,450
Detaile																	
60	1	Rad Analysis Rad Soils	135.00	EA									54,000			400	54,000
Detaile																	
LIST Cost Detail																	
	1.0 URADANAL	Rad Analysis	135.00	EA	U								400.00			400	54,000
			UCC to Activity:		U								400.00			400	54,000
		Resource List UCC to Activity:			U								400.00			400	54,000
60	2	TCLP Analysis Lead Soil	135.00	EA									36,450			270	36,450
Detaile																	
LIST Cost Detail																	
	1.0 UTCLPAN	TCLP Analysis	135.00	EA	U								270.00			270	36,450
			UCC to Activity:		U								270.00			270	36,450
		Resource List UCC to Activity:			U								270.00			270	36,450
70		Stabilization	1.00	LS		9,215.36				107,402	60,248		61,556			238,423	238,423
Detaile																	
70	1	Transport Soil Stockpile	11,158	CY		4,188.80				6,800.00						1	10,989
Detaile																	
CREW Cost Detail																	

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Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
	10.0 Days	1115.800 CY/Da		0.0009	Da/CY			1098.88	Cost/Da									
	10.0 Shifts	1115.800 CY/Sh		0.0009	Sh/CY			1098.88	Cost/Sh									
	80.0 Hours	139.4750 CY/Hr		0.0072	Hr/CY			137.36	Cost/Hr									
1.0	LWSLAB	Site Laborer		80.00	HR	U	14.64										15	1,171
			UCC to Activity:			U	0.10										0	1,171
2.0	LWSLOP	Equipment Operator		160.00	HR	U	18.86										19	3,018
			UCC to Activity:			U	0.27										0	3,018
2.0	RARTDUMP	Articulating Dump Truck		160.00	HR	U					42.50						43	6,800
			UCC to Activity:			U					0.61						1	6,800
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.38				0.61						1	10,989
70	2		Pug Mill Process	11,158	CY						92,442	60,248		48,326			18	201,017
Detaile																		
LIST Cost Detail																		
1.0	UPUGMOB	Mob/Maintain Pug Mill		0.78	LS	U								18,400			18,400	14,378
			UCC to Activity:			U								1.29			1	14,378
1.0	UPUGRENT	Pug Mill Rental		3.91	MO	U					9,660.00						9,660	37,743
			UCC to Activity:			U					3.38						3	37,743
1.0	UPHOSACD	Phosphoric Acid,pH agent		401.65	TN	U						150.00					150	60,248
			UCC to Activity:			U						5.40					5	60,248
1.0	UACIDPMP	Acid Pump Rental		3.91	MO	U					10,000						10,000	39,071
			UCC to Activity:			U					3.50						4	39,071
1.0	USTORAGE	Storage of acid,pH red.ag		0.78	LS	U								10,000			10,000	7,814
			UCC to Activity:			U								0.70			1	7,814
1.0	UPWRPUGM	Power for Pug Mill		0.78	LS	U								15,000			15,000	11,721
			UCC to Activity:			U								1.05			1	11,721
1.0	UANCEQUP	Ancillary Equip.for Pug		3.91	MO	U					4,000.00						4,000	15,629
			UCC to Activity:			U					1.40						1	15,629
1.0	ULOADSOL	Load soil into Pug Mill		11,158	CY	U								1.22			1	13,613
			UCC to Activity:			U								1.22			1	13,613
1.0	ULOADPHS	Load Phosphoric in Pug		261.39	CY	U								1.53			2	400
			UCC to Activity:			U								0.04			0	400
1.0	ULODPH	Load pH Reduct in Pug		261.39	CY	U								1.53			2	400
			UCC to Activity:			U								0.04			0	400
			Resource List UCC to Activity:			U					8.28	5.40		4.33			18	201,017
70	3		Confirmation Testing	49.00	EA									13,230			270	13,230
Detaile																		
LIST Cost Detail																		
1.0	UTCLPAN	TCLP Analysis		49.00	EA	U								270.00			270	13,230
			UCC to Activity:			U								270.00			270	13,230
			Resource List UCC to Activity:			U								270.00			270	13,230
70	4		Transport to Stockpile	12,274	CY		5,026.56				8,160.00						1	13,187
Detaile																		
CREW Cost Detail																		
	12.0 Days	1022.833 CY/Da		0.0010	Da/CY			1098.88	Cost/Da									
	12.0 Shifts	1022.833 CY/Sh		0.0010	Sh/CY			1098.88	Cost/Sh									
	96.0 Hours	127.8542 CY/Hr		0.0078	Hr/CY			137.36	Cost/Hr									
1.0	LWSLAB	Site Laborer		96.00	HR	U	14.64										15	1,405
			UCC to Activity:			U	0.11										0	1,405
2.0	LWSLOP	Equipment Operator		192.00	HR	U	18.86										19	3,621
			UCC to Activity:			U	0.30										0	3,621
2.0	RARTDUMP	Articulating Dump Truck		192.00	HR	U					42.50						43	8,160
			UCC to Activity:			U					0.66						1	8,160
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.41				0.66						1	13,187
80			Confirmatory Sampling	1.00	LS									65,540			65,540	65,540
Detaile																		
80	1		Confirmatory Sampling	113.00	EA									65,540			580	65,540
Detaile																		
LIST Cost Detail																		
1.0	URADANAL	Rad Analysis		113.00	EA	U								400.00			400	45,200
			UCC to Activity:			U								400.00			400	45,200
1.0	UMETALAN	Metals Analysis		113.00	EA	U								180.00			180	20,340
			UCC to Activity:			U								180.00			180	20,340
			Resource List UCC to Activity:			U								580.00			580	65,540

Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
90			Additional Excavation	1.00	LS		942.48				3,735.00						4,677	4,677
Detaile																		
90	1		Exc,Stockpile Soil/DA	1.270.00	CY		837.76				3,320.00						3	4,158
Detaile																		
CREW Cost Detail																		
	2.0 Days		635.0000 CY/Da	0.0016	Da/CY			2078.88	Cost/Da									
	2.0 Shifts		635.0000 CY/Sh	0.0016	Sh/CY			2078.88	Cost/Sh									
	16.0 Hours		79.3750 CY/Hr	0.0126	Hr/CY			259.86	Cost/Hr									
	2.0	LWSLOP	Equipment Operator	32.00	HR	U	18.86										19	604
				UCC to Activity:		U	0.48										0	604
	2.0	REXC330	Excavator CAT 325B	32.00	HR	U					82.50						83	2,640
				UCC to Activity:		U					2.08						2	2,640
	1.0	LWSLAB	Site Laborer	16.00	HR	U	14.64										15	234
				UCC to Activity:		U	0.18										0	234
	1.0	RARTDUMP	Articulating Dump Truck	16.00	HR	U					42.50						43	680
				UCC to Activity:		U					0.54						1	680
			Resource List Hour Rate:			U	52.36				207.50						260	
			Resource List UCC to Activity:			U	0.66				2.61						3	4,158
90	2		Exc,Stockpile Soil/EA	139.00	CY		104.72				415.00						4	520
Detaile																		
CREW Cost Detail																		
	0.3 Days		556.0000 CY/Da	0.0018	Da/CY			2078.88	Cost/Da									
	0.3 Shifts		556.0000 CY/Sh	0.0018	Sh/CY			2078.88	Cost/Sh									
	2.0 Hours		69.5000 CY/Hr	0.0144	Hr/CY			259.86	Cost/Hr									
	2.0	LWSLOP	Equipment Operator	4.00	HR	U	18.86										19	75
				UCC to Activity:		U	0.54										1	75
	1.0	LWSLAB	Site Laborer	2.00	HR	U	14.64										15	29
				UCC to Activity:		U	0.21										0	29
	2.0	REXC330	Excavator CAT 325B	4.00	HR	U					82.50						83	330
				UCC to Activity:		U					2.37						2	330
	1.0	RARTDUMP	Articulating Dump Truck	2.00	HR	U					42.50						43	85
				UCC to Activity:		U					0.61						1	85
			Resource List Hour Rate:			U	52.36				207.50						260	
			Resource List UCC to Activity:			U	0.75				2.99						4	520
100			Confirmatory Sampling AE	1.00	LS													
Detaile														3,480.00			3,480	3,480
100	1		Confirmatory Sampling AE	6.00	EA									3,480.00			580	3,480
Detaile																		
LIST Cost Detail																		
	1.0	URADANAL	Rad Analysis	6.00	EA	U								400.00			400	2,400
				UCC to Activity:		U								400.00			400	2,400
	1.0	UMETALAN	Metals Analysis	6.00	EA	U								180.00			180	1,080
				UCC to Activity:		U								180.00			180	1,080
			Resource List UCC to Activity:			U								580.00			580	3,480
110			Onsite Disposal Soil DA	1.00	LS		22,200				53,260						75,461	75,461
Detaile																		
110	1		Transport from Stockpile	32,400	CY		13,404				21,760						1	35,164
Detaile																		
CREW Cost Detail																		
	32.0 Days		1012.500 CY/Da	0.0010	Da/CY			1098.88	Cost/Da									
	32.0 Shifts		1012.500 CY/Sh	0.0010	Sh/CY			1098.88	Cost/Sh									
	256.0 Hours		126.5625 CY/Hr	0.0079	Hr/CY			137.36	Cost/Hr									
	1.0	LWSLAB	Site Laborer	256.00	HR	U	14.64										15	3,748
				UCC to Activity:		U	0.12										0	3,748
	2.0	LWSLOP	Equipment Operator	512.00	HR	U	18.86										19	9,656
				UCC to Activity:		U	0.30										0	9,656
	2.0	RARTDUMP	Articulating Dump Truck	512.00	HR	U					42.50						43	21,760
				UCC to Activity:		U					0.67						1	21,760
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.41				0.67						1	35,164

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Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
110	2	Place & Compact Soil	32,400	CY		8,796.48				31,500						1	40,296
Detaile																	
CREW Cost Detail																	
	21.0 Days	1542.857 CY/Da	0.0006 Da/CY			1918.88 Cost/Da											
	21.0 Shifts	1542.857 CY/Sh	0.0006 Sh/CY			1918.88 Cost/Sh											
	168.0 Hours	192.8571 CY/Hr	0.0052 Hr/CY			239.86 Cost/Hr											
	2.0 LWSLOP	Equipment Operator	336.00	HR	U	18.86										19	6,337
		UCC to Activity:			U	0.20										0	6,337
	1.0 LWSLAB	Site Laborer	168.00	HR	U	14.64										15	2,460
		UCC to Activity:			U	0.08										0	2,460
	2.0 RCOMPACT	Compactor CAT CS323C	336.00	HR	U					93.75						94	31,500
		UCC to Activity:			U					0.97						1	31,500
		Resource List Hour Rate:			U	52.36				187.50						240	
		Resource List UCC to Activity:			U	0.27				0.97						1	40,296
120		Composite Cover DA	1.00	LS		8,981.19				17,706	180,937		39,998			247,625	247,625
Detaile																	
120	1	18" Compacted Clay	4,269.00	CY		1,882.31				5,706.98	34,152					10	41,741
Detaile																	
LIST Cost Detail																	
	1.0 MCLAY	Clay	4,269.00	CY	U						8.00					8	34,152
		UCC to Activity:			U						8.00					8	34,152
		Resource List UCC to Activity:			U						8.00					8	34,152
CREW Cost Detail																	
	4.5 Days	950.0000 CY/Da	0.0011 Da/CY			1688.88 Cost/Da											
	4.5 Shifts	950.0000 CY/Sh	0.0011 Sh/CY			1688.88 Cost/Sh											
	35.9 Hours	118.7500 CY/Hr	0.0084 Hr/CY			211.11 Cost/Hr											
	2.0 LWSLOP	Equipment Operator	71.90	HR	U	18.86										19	1,356
		UCC to Activity:			U	0.32										0	1,356
	1.0 RDOZERD8	CAT D-8 Dozer	35.95	HR	U					65.00						65	2,337
		UCC to Activity:			U					0.55						1	2,337
	1.0 LWSLAB	Site Laborer	35.95	HR	U	14.64										15	526
		UCC to Activity:			U	0.12										0	526
	1.0 RCOMPACT	Compactor CAT CS323C	35.95	HR	U					93.75						94	3,370
		UCC to Activity:			U					0.79						1	3,370
		Resource List Hour Rate:			U	52.36				158.75						211	
		Resource List UCC to Activity:			U	0.44				1.34						2	7,589
120	2	12oz Non-Woven Geotextile	83,888	SF		1,405.44					17,616					0	19,022
Detaile																	
LIST Cost Detail																	
	1.0 MGEOTEXT	Geotextile Fabric	83,888	SF	U						0.21					0	17,616
		UCC to Activity:			U						0.21					0	17,616
		Resource List UCC to Activity:			U						0.21					0	17,616
CREW Cost Detail																	
	6.0 Days	13981.33 SF/Da	0.0001 Da/SF			234.24 Cost/Da											
	6.0 Shifts	13981.33 SF/Sh	0.0001 Sh/SF			234.24 Cost/Sh											
	48.0 Hours	1749.667 SF/Hr	0.0006 Hr/SF			29.28 Cost/Hr											
	2.0 LWSLAB	Site Laborer	96.00	HR	U	14.64										15	1,405
		UCC to Activity:			U	0.02										0	1,405
		Resource List Hour Rate:			U	29.28										29	
		Resource List UCC to Activity:			U	0.02										0	1,405
120	3	40mil PVC Geomembrane	83,888	SF									35,232			0	35,233
Detaile																	
LIST Cost Detail																	
	1.0 U40MILNR	40 mil Liner	83,888	SF	U								0.42			0	35,233
		UCC to Activity:			U								0.42			0	35,233
		Resource List UCC to Activity:			U								0.42			0	35,233

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Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
120	4	Drainage Net	83,888	SF		936.96					8,388.80					0	9,326
Detaile																	
LIST Cost Detail																	
1.0	MDRAINET	Drainage Net	83,888	SF	U						0.10					0	8,389
		UCC to Activity:			U						0.10					0	8,389
		Resource List UCC to Activity:			U						0.10					0	8,389
CREW Cost Detail																	
4.0 Days		20972.00 SF/Da	0.0000 Da/SF			234.24 Cost/Da											
4.0 Shifts		20972.00 SF/Sh	0.0000 Sh/SF			234.24 Cost/Sh											
32.0 Hours		2621.500 SF/Hr	0.0004 Hr/SF			29.28 Cost/Hr											
2.0	LWSLAB	Site Laborer	64.00	HR	U	14.64										15	937
		UCC to Activity:			U	0.01										0	937
		Resource List Hour Rate:			U	29.28										29	
		Resource List UCC to Activity:			U	0.01										0	937
120	5	6oz Non-Woven Geotextile	83,888	SF		1,405.44					17,616					0	19,022
Detaile																	
LIST Cost Detail																	
1.0	MGEOTEXT	Geotextile Fabric	83,888	SF	U						0.21					0	17,616
		UCC to Activity:			U						0.21					0	17,616
		Resource List UCC to Activity:			U						0.21					0	17,616
CREW Cost Detail																	
6.0 Days		13981.33 SF/Da	0.0001 Da/SF			234.24 Cost/Da											
6.0 Shifts		13981.33 SF/Sh	0.0001 Sh/SF			234.24 Cost/Sh											
48.0 Hours		1747.667 SF/Hr	0.0006 Hr/SF			29.28 Cost/Hr											
2.0	LWSLAB	Site Laborer	96.00	HR	U	14.64										15	1,405
		UCC to Activity:			U	0.02										0	1,405
		Resource List Hour Rate:			U	29.28										29	
		Resource List UCC to Activity:			U	0.02										0	1,405
120	6	Barrier Protection Soil	6,214.00	CY		2,513.28				9,000.00	78,300					14	89,813
Detaile																	
LIST Cost Detail																	
1.0	MFILLMTL	Fill Material	8,700.00	CY	U						9.00					9	78,300
		UCC to Activity:			U						12.60					13	78,300
		Resource List UCC to Activity:			U						12.60					13	78,300
CREW Cost Detail																	
6.0 Days		1035.667 CY/Da	0.0010 Da/CY			1918.88 Cost/Da											
6.0 Shifts		1035.667 CY/Sh	0.0010 Sh/CY			1918.88 Cost/Sh											
48.0 Hours		129.4583 CY/Hr	0.0077 Hr/CY			239.86 Cost/Hr											
2.0	LWSLOP	Equipment Operator	96.00	HR	U	18.86										19	1,811
		UCC to Activity:			U	0.29										0	1,811
1.0	LWSLAB	Site Laborer	48.00	HR	U	14.64										15	703
		UCC to Activity:			U	0.11										0	703
2.0	RCOMPACT	Compactor CAT CS323C	96.00	HR	U					93.75						94	9,000
		UCC to Activity:			U					1.45						1	9,000
		Resource List Hour Rate:			U	52.36				187.50						240	
		Resource List UCC to Activity:			U	0.40				1.45						2	11,513
120	7	Topsoil	1,554.00	CY		837.76				3,000.00	24,864					18	28,702
Detaile																	
LIST Cost Detail																	
1.0	MTOPSOIL	Topsoil	1,554.00	CY	U						16.00					16	24,864
		UCC to Activity:			U						16.00					16	24,864
		Resource List UCC to Activity:			U						16.00					16	24,864
CREW Cost Detail																	
2.0 Days		777.0000 CY/Da	0.0013 Da/CY			1918.88 Cost/Da											
2.0 Shifts		777.0000 CY/Sh	0.0013 Sh/CY			1918.88 Cost/Sh											
16.0 Hours		97.1250 CY/Hr	0.0103 Hr/CY			239.86 Cost/Hr											

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Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
	2.0	LWSLOP	Equipment Operator	32.00	HR	U	18.86										19	604
			UCC to Activity:			U	0.39										0	604
	1.0	LWSLAB	Site Laborer	16.00	HR	U	14.64										15	234
			UCC to Activity:			U	0.15										0	234
	2.0	RCOMPACT	Compactor CAT CS323C	32.00	HR	U					93.75						94	3,000
			UCC to Activity:			U					1.93						2	3,000
			Resource List Hour Rate:			U	52.36				187.50						240	
			Resource List UCC to Activity:			U	0.54				1.93						2	3,838
120	8		Vegetative Cover	85,788	SF									4,766.00			0	4,766
Detaile																		
LIST Cost Detail																		
	1.0	USEEDING	Seeding	9,532.00	SY	U								0.50			1	4,766
			UCC to Activity:			U								0.06			0	4,766
			Resource List UCC to Activity:			U								0.06			0	4,766
130			T & D Offsite	1.00	LS		14,660				23,800			821,230			859,691	859,691
Detaile																		
130	1		Transport from Stockpile	36,620	CY		14,660				23,800						1	38,461
Detaile																		
CREW Cost Detail																		
	35.0 Days		1046.286 CY/Da	0.0010 Da/CY			1098.88 Cost/Da											
	35.0 Shifts		1046.286 CY/Sh	0.0010 Sh/CY			1098.88 Cost/Sh											
	280.0 Hours		130.7857 CY/Hr	0.0076 Hr/CY			137.36 Cost/Hr											
	1.0	LWSLAB	Site Laborer	280.00	HR	U	14.64										15	4,099
			UCC to Activity:			U	0.11										0	4,099
	2.0	LWSLOP	Equipment Operator	560.00	HR	U	18.86										19	10,562
			UCC to Activity:			U	0.29										0	10,562
	2.0	RARTDUMP	Articulating Dump Truck	560.00	HR	U					42.50						43	23,800
			UCC to Activity:			U					0.65						1	23,800
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.40				0.65						1	38,461
130	2		T & D Subtitlt C (LLRW)	1,250.00	CY									311,875			250	311,875
Detaile																		
LIST Cost Detail																		
	Note:		1cy = 1.2tons															
	1.0	UDISPEUT	Disposal Subtitle C(LLRW)	1,250.00	CY	U								149.50			150	186,875
			UCC to Activity:			U								149.50			150	186,875
	1.0	UTRANSPT	Transport by Rail	1,250.00	CY	U								100.00			100	125,000
			UCC to Activity:			U								100.00			100	125,000
			Resource List UCC to Activity:			U								249.50			250	311,875
130	3		T & D Subtitle C (LARM)	2,970.00	CY									509,355			172	509,355
Detaile																		
LIST Cost Detail																		
	Note:		1cy = 1.2tons															
	1.0	UDISRNSF	Disposal Subtitle C(LARM)	2,970.00	CY	U								71.50			72	212,355
			UCC to Activity:			U								71.50			72	212,355
	1.0	UTRANSPT	Transport by Rail	2,970.00	CY	U								100.00			100	297,000
			UCC to Activity:			U								100.00			100	297,000
			Resource List UCC to Activity:			U								171.50			172	509,355
130	4		T & D Soils Subtitle D LF	1.00	CY									0.00			0	0
Detaile																		
LIST Cost Detail																		
	Note:		1 cy = 1.2 tons															
	1.0	UT&DVOC	T & D VOC Soils	0.00	TN	U								45.00			45	0
			UCC to Activity:			U								0.00			0	0
			Resource List UCC to Activity:			U								0.00			0	0
140			Offsite Disposal VOC,SVOC	1.00	LS		62.06				100.74			31,725			31,888	31,888
Detaile																		

Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
140	1		Characterization Sampling	10.00	EA									6,000.00			600	6,000
Detaile																		
LIST Cost Detail																		
	1.0	UVOCANAL	VOC Analysis	10.00	EA	U								225.00			225	2,250
				UCC to Activity:		U								225.00			225	2,250
	1.0	USVOCANL	SVOC Analysis	10.00	EA	U								375.00			375	3,750
				UCC to Activity:		U								375.00			375	3,750
			Resource List UCC to Activity:			U								600.00			600	6,000
140	2		T & D Soils	150.00	TN									25,725			172	25,725
Detaile																		
LIST Cost Detail																		
	1.0	UT&DSUBD	T & D Subtitle D Landfill	150.00	TN	U								171.50			172	25,725
				UCC to Activity:		U								171.50			172	25,725
			Resource List UCC to Activity:			U								171.50			172	25,725
140	3		Transport to Stockpile	150.00	CY		62.06				100.74						1	163
Detaile																		
CREW Cost Detail																		
	0.1 Days		1012.500 CY/Da	0.0010 Da/CY		1098.88 Cost/Da												
	0.1 Shifts		1012.500 CY/Sh	0.0010 Sh/CY		1098.88 Cost/Sh												
	1.2 Hours		126.5625 CY/Hr	0.0079 Hr/CY		137.36 Cost/Hr												
	1.0	LWSLAB	Site Laborer	1.19	HR	U	14.64										15	17
				UCC to Activity:		U	0.12										0	17
	2.0	LWSLOP	Equipment Operator	2.37	HR	U	18.86										19	45
				UCC to Activity:		U	0.30										0	45
	2.0	RARTDUMP	Articulating Dump Truck	2.37	HR	U					42.50						43	101
				UCC to Activity:		U					0.67						1	101
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.41				0.67						1	163
150			GW Monitoring Wells	10.00	EA									25,000			2,500	25,000
Detaile																		
150	1		GW Monitoring Wells	10.00	EA									25,000			2,500	25,000
Detaile																		
LIST Cost Detail																		
	1.0	UGWELLS	GW Monitoring Wells	10.00	EA	U								2,500.00			2,500	25,000
				UCC to Activity:		U								2,500.00			2,500	25,000
			Resource List UCC to Activity:			U								2,500.00			2,500	25,000
160			Site Restoration EA	1.00	LS		16,755				60,000	292,914		9,502.50			379,172	379,172
Detaile																		
160	1		Fill Material	32,546	CY							292,914					9	292,914
Detaile																		
LIST Cost Detail																		
	1.0	MFILLMTL	Fill Material	32,546	CY	U						9.00					9	292,914
				UCC to Activity:		U						9.00					9	292,914
			Resource List UCC to Activity:			U						9.00					9	292,914
160	2		Spread,Compact,Grade Fill	32,546	CY		16,755				60,000						2	76,755
Detaile																		
CREW Cost Detail																		
	40.0 Days		813.6500 CY/Da	0.0012 Da/CY		1918.88 Cost/Da												
	40.0 Shifts		813.6500 CY/Sh	0.0012 Sh/CY		1918.88 Cost/Sh												
	320.0 Hours		101.7063 CY/Hr	0.0098 Hr/CY		239.86 Cost/Hr												
	2.0	LWSLOP	Equipment Operator	640.00	HR	U	18.86										19	12,070
				UCC to Activity:		U	0.37										0	12,070
	1.0	LWSLAB	Site Laborer	320.00	HR	U	14.64										15	4,685
				UCC to Activity:		U	0.14										0	4,685
	2.0	RCOMPACT	Compactor CAT CS323C	640.00	HR	U					93.75						94	60,000
				UCC to Activity:		U					1.84						2	60,000
			Resource List Hour Rate:			U	52.36				187.50						240	
			Resource List UCC to Activity:			U	0.51				1.84						2	76,755

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Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
160	3	Seed Area	10.50	AC									9,502.50			905	9,503
Detaile																	
LIST Cost Detail																	
	1.0 USEED	Seeding	10.50	AC	U								905.00			905	9,503
			UCC to Activity:		U								905.00			905	9,503
		Resource List UCC to Activity:			U								905.00			905	9,503
170		Demobilization	1.00	LS		5,360.00							15,000			20,360	20,360
Detaile																	
LIST Cost Detail																	
	1.0 UDEMOBTR	Demob Trailers	6.00	EA	U								500.00			500	3,000
			UCC to Activity:		U								3,000.00			3,000	3,000
	1.0 UDEMOBEQ	Demob Equipment	10.00	EA	U								300.00			300	3,000
			UCC to Activity:		U								3,000.00			3,000	3,000
	1.0 UDISMUTL	Dismantle Utilities	1.00	LS	U								6,000.00			6,000	6,000
			UCC to Activity:		U								6,000.00			6,000	6,000
	1.0 UDISPOSL	Disposal of Debris	1.00	LS	U								3,000.00			3,000	3,000
			UCC to Activity:		U								3,000.00			3,000	3,000
		Resource List UCC to Activity:			U								15,000			15,000	15,000
CREW Cost Detail																	
	10.0 Days	0.1000 LS/Da	10.0000 Da/LS		536.00 Cost/Da												
	10.0 Shifts	0.1000 LS/Sh	10.0000 Sh/LS		536.00 Cost/Sh												
	80.0 Hours	0.0125 LS/Hr	80.0000 Hr/LS		67.00 Cost/Hr												
	2.0 LWSLOP	Equipment Operator	160.00	HR	U	18.86										19	3,018
			UCC to Activity:		U	3,017.60										3,018	3,018
	2.0 LWSLAB	Site Laborer	160.00	HR	U	14.64										15	2,342
			UCC to Activity:		U	2,342.40										2,342	2,342
		Resource List Hour Rate:			U	67.00										67	
		Resource List UCC to Activity:			U	5,360.00										5,360	5,360
190		Indirect Construct Cost	1.00	LS									1557306			1557306	1557306
Detaile																	
190	1	Permit & Legal (5%)	1.00	LS									86,517			86,517	86,517
Detaile																	
LIST Cost Detail																	
	1.0 UPERMLGL	Permit & Legal 5%	1.00	LS	U								86,517			86,517	86,517
			UCC to Activity:		U								86,517			86,517	86,517
		Resource List UCC to Activity:			U								86,517			86,517	86,517
190	2	Health & Safety (10%)	1.00	LS									173,034			173,034	173,034
Detaile																	
LIST Cost Detail																	
	1.0 UH&S	Health & Safety 10%	1.00	LS	U								173,034			173,034	173,034
			UCC to Activity:		U								173,034			173,034	173,034
		Resource List UCC to Activity:			U								173,034			173,034	173,034
190	3	Construct Management(10%)	1.00	LS									173,034			173,034	173,034
Detaile																	
LIST Cost Detail																	
	1.0 UCONSTMG	Construct Management 10%	1.00	LS	U								173,034			173,034	173,034
			UCC to Activity:		U								173,034			173,034	173,034
		Resource List UCC to Activity:			U								173,034			173,034	173,034
190	4	QA & Oversight (10%)	1.00	LS									173,034			173,034	173,034
Detaile																	
LIST Cost Detail																	
	1.0 UQAOVEST	QA & Oversight 10%	1.00	LS	U								173,034			173,034	173,034
			UCC to Activity:		U								173,034			173,034	173,034
		Resource List UCC to Activity:			U								173,034			173,034	173,034
190	5	Bid & Scope Conting.(10%)	1.00	LS									173,034			173,034	173,034
Detaile																	
LIST Cost Detail																	
	1.0 UBIDSCPE	Bid & Scope Conting. 10%	1.00	LS	U								173,034			173,034	173,034
			UCC to Activity:		U								173,034			173,034	173,034
		Resource List UCC to Activity:			U								173,034			173,034	173,034

Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
190	6	Cert.Consruct.Report (5%)	1.00	LS									86,517			86,517	86,517
Detaile																	
LIST Cost Detail																	
1.0	UCERTREP	Cert. Constrct. Report 5%	1.00	LS	U								86,517			86,517	86,517
		UCC to Activity:			U								86,517			86,517	86,517
		Resource List UCC to Activity:			U								86,517			86,517	86,517
190	7	Surveying/GPS (10%)	1.00	LS									173,034			173,034	173,034
Detaile																	
LIST Cost Detail																	
1.0	USURVEYG	Survey/GPS 10%	1.00	LS	U								173,034			173,034	173,034
		UCC to Activity:			U								173,034			173,034	173,034
		Resource List UCC to Activity:			U								173,034			173,034	173,034
190	8	Office Proj. Mgmt (10%)	1.00	LS									173,034			173,034	173,034
Detaile																	
LIST Cost Detail																	
1.0	UPROJMGM	Office Project Manage 10%	1.00	LS	U								173,034			173,034	173,034
		UCC to Activity:			U								173,034			173,034	173,034
		Resource List UCC to Activity:			U								173,034			173,034	173,034
190	9	Miscellaneous (ODCs) (5%)	1.00	LS									86,517			86,517	86,517
Detaile																	
LIST Cost Detail																	
1.0	UMISC	Miscellaneous ODC's 5%	1.00	LS	U								86,517			86,517	86,517
		UCC to Activity:			U								86,517			86,517	86,517
		Resource List UCC to Activity:			U								86,517			86,517	86,517
190	10	Health Physics Support-5%	1.00	LS									86,517			86,517	86,517
Detaile																	
LIST Cost Detail																	
1.0	UHEALPHY	Health Physics Sup. 5%	1.00	LS	U								86,517			86,517	86,517
		UCC to Activity:			U								86,517			86,517	86,517
		Resource List UCC to Activity:			U								86,517			86,517	86,517
190	11	Gen.Contingency (10%)	1.00	LS									173,034			173,034	173,034
Detaile																	
LIST Cost Detail																	
1.0	UGENCONT	General Contingency 10%	1.00	LS	U								173,034			173,034	173,034
		UCC to Activity:			U								173,034			173,034	173,034
		Resource List UCC to Activity:			U								173,034			173,034	173,034
200		Post Closure Activity(PW)	1.00	LS									1266458			1266458	1266458
Detaile																	
200	1	Maintain Cover DA	1.00	LS									390,582			390,582	390,582
Detaile																	
LIST Cost Detail																	
1.0	UO&MCAP	O & M of Cap	2.41	LS	U								162,000			162,000	390,582
		UCC to Activity:			U								390,582			390,582	390,582
		Resource List UCC to Activity:			U								390,582			390,582	390,582
200	2	Quarterly Monitoring Well	4.00	EA									805,776			201,444	805,776
Detaile																	
LIST Cost Detail																	
1.0	UGWMONOM	GW Monitoring sampling	1.62	LS	U								497,700			497,700	805,776
		UCC to Activity:			U								201,444			201,444	805,776
		Resource List UCC to Activity:			U								201,444			201,444	805,776
200	3	CERCLA Reviews	1.00	LS									70,100			70,100	70,100
Detaile																	
LIST Cost Detail																	
1.0	USUMREPT	Summary Report PresentWth	1.00	LS	U								70,100			70,100	70,100
		UCC to Activity:			U								70,100			70,100	70,100
		Resource List UCC to Activity:			U								70,100			70,100	70,100

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ALTERNATIVE 2B, RECOMMENDED

Job Description: Colonie Site Recommend 2B

Proposal Date:
Time:

From: ROY F. WESTON, INC.

Bid Item Number	Bid Item Description	Quantity	UM	Unit Price	Total Price
10	Mobilization & Site Preparation	1.0000	LS	0.00	**0.00**
20	Buried Drums	25.0000	EA	566.04	**14,151.00**
30	Divert Tributary	1.0000	LS	121,596.00	**121,596.00**
40	Dewater Excavation	1.0000	LS	174,609.76	**174,609.76**
50	Excavation	1.0000	LS	447,651.36	**447,651.36**
60	Characterization of Stockpiled Soils	1.0000	LS	199,660.00	**199,660.00**
70	Stabilization of Lead Soils	1.0000	LS	527,484.55	**527,484.55**
80	Confirmatory Sampling	1.0000	LS	144,420.00	**144,420.00**
90	Additional Excavation	1.0000	LS	9,354.96	**9,354.96**
100	Confirmatory Sampling AE	1.0000	LS	6,960.00	**6,960.00**
110	Transport & Dispose Offsite	1.0000	LS	14,036,366.52	**14,036,366.52**
120	Offsite Disposal VOC,SVOC	1.0000	LS	31,888.17	**31,888.17**
125	Groundwater Monitoring Wells	10.0000	EA	2,500.00	**25,000.00**
130	Site Restoration	1.0000	LS	828,139.82	**828,139.82**
140	Demobilize	1.0000	LS	20,360.00	**20,360.00**
	Direct Construction Cost			Subtotal Running Total	**16,587,642.14** **16,587,642.14**
150	Indirect Construction Cost	1.0000	LS	2,296,152.00	**2,296,152.00**
	Indirect Construction Cost			Subtotal Running Total	**2,296,152.00** **18,883,794.14**
200	Post Closure Activites (Present Worth)	1.0000	LS	875,876.30	**875,876.30**
				GRAND TOTAL	**19,759,670.44**

Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
10			Mobilization & Site Prep	1.00	LS													
Detaile																		
20			Buried Drums	25.00	EA		536.00				240.00	4,625.00		8,750.00			566	14,151
Detaile																		
20	1		Repackage Drums	25.00	EA		536.00				240.00	4,625.00					216	5,401
Detaile																		
LIST Cost Detail																		
	1.0	MOVERPAC	Overpac Drums	25.00	EA	U						185.00					185	4,625
				UCC to Activity:		U						185.00					185	4,625
			Resource List UCC to Activity:			U						185.00					185	4,625
CREW Cost Detail																		
	2.0 Days		12.5000 EA/Da		0.0800 Da/EA		388.00 Cost/Da											
	2.0 Shifts		12.5000 EA/Sh		0.0800 Sh/EA		388.00 Cost/Sh											
	16.0 Hours		1.5625 EA/Hr		0.6400 Hr/EA		48.50 Cost/Hr											
	1.0	LWSLAB	Site Laborer	16.00	HR	U	14.64										15	234
				UCC to Activity:		U	9.37										9	234
	1.0	LWSLOP	Equipment Operator	16.00	HR	U	18.86										19	302
				UCC to Activity:		U	12.07										12	302
	1.0	RBACKHOE	Backhoe JD 710	16.00	HR	U					15.00						15	240
				UCC to Activity:		U					9.60						10	240
			Resource List Hour Rate:			U	33.50				15.00						49	
			Resource List UCC to Activity:			U	21.44				9.60						31	776
20	2		Offsite Transport&Dispose	25.00	EA									8,750.00			350	8,750
Detaile																		
LIST Cost Detail																		
	1.0	UT&DRUM	T&D Envirocare UT Drums	25.00	EA	U								350.00			350	8,750
				UCC to Activity:		U								350.00			350	8,750
			Resource List UCC to Activity:			U								350.00			350	8,750
30			Divert Tributary	1.00	LS		4,556.00				16,440	58,600		42,000			121,596	121,596
Detaile																		
30	1		Divert Pipeline	1,000.00	LF		4,020.00				16,200	58,000		42,000			120	120,220
Detaile																		
LIST Cost Detail																		
	1.0	UHORZBOR	Horizontal Boring	100.00	LF	U								420.00			420	42,000
				UCC to Activity:		U								42.00			42	42,000
	1.0	M4'DPIPE	4'dia. pipe	1,000.00	LF	U						58.00					58	58,000
				UCC to Activity:		U						58.00					58	58,000
			Resource List UCC to Activity:			U						58.00		42.00			100	100,000
CREW Cost Detail																		
	Note:		Excavate & Backfill for new pipe. Horizontal Bore under Railroad Tracks.															
	15.0 Days		66.6667 LF/Da		0.0150 Da/LF		1348.00 Cost/Da											
	15.0 Shifts		66.6667 LF/Sh		0.0150 Sh/LF		1348.00 Cost/Sh											
	120.0 Hours		8.3333 LF/Hr		0.1200 Hr/LF		168.50 Cost/Hr											
	1.0	LWSLAB	Site Laborer	120.00	HR	U	14.64										15	1,757
				UCC to Activity:		U	1.76										2	1,757
	1.0	LWSLOP	Equipment Operator	120.00	HR	U	18.86										19	2,263
				UCC to Activity:		U	2.26										2	2,263
	1.0	RBACKHOE	Backhoe JD 710	120.00	HR	U					15.00						15	1,800
				UCC to Activity:		U					1.80						2	1,800
	1.0	RCRANE	Crane W/Operator	120.00	HR	U					120.00						120	14,400
				UCC to Activity:		U					14.40						14	14,400
			Resource List Hour Rate:			U	33.50				135.00						169	
			Resource List UCC to Activity:			U	4.02				16.20						20	20,220
30	2		Plug & Abandon Ex.Culvert	2.00	EA		536.00				240.00	600.00					688	1,376
Detaile																		
LIST Cost Detail																		
	1.0	MPLUGS	48" Pluge	2.00	EA	U						300.00					300	600
				UCC to Activity:		U						300.00					300	600
			Resource List UCC to Activity:			U						300.00					300	600
CREW Cost Detail																		

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Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
	2.0 Days	1.0000 EA/Da	1.0000 Da/EA				388.00 Cost/Da										
	2.0 Shifts	1.0000 EA/Sh	1.0000 Sh/EA				388.00 Cost/Sh										
	16.0 Hours	0.1250 EA/Hr	8.0000 Hr/EA				48.50 Cost/Hr										
1.0	LWSLAB	Site Laborer	16.00	HR	U	14.64										15	234
		UCC to Activity:			U	117.12										117	234
1.0	LWSLOP	Equipment Operator	16.00	HR	U	18.86										19	302
		UCC to Activity:			U	150.88										151	302
1.0	RBACKHOE	Backhoe JD 710	16.00	HR	U					15.00						15	240
		UCC to Activity:			U					120.00						120	240
		Resource List Hour Rate:			U	33.50				15.00						49	
		Resource List UCC to Activity:			U	268.00				120.00						388	776
40		Dewater Excavation	1.00	LS		145,600							29,009			174,610	174,610
Detaile																	
40	1	Operator 24hr/day	20.00	WK		100,800										5,040	100,800
Detaile																	
LIST Cost Detail																	
	Note:	Operate 24 hours/day															
	420.0 Days	0.0476 WK/Da	21.0000 Da/WK				240.00 Cost/Da										
	420.0 Shifts	0.0476 WK/Sh	21.0000 Sh/WK				240.00 Cost/Sh										
	3360.0 Hours	0.0060 WK/Hr	168.0000 Hr/WK				30.00 Cost/Hr										
1.0	LDWOPER	Dewatering Operator	3,360.00	HR	U	30.00										30	100,800
		UCC to Activity:			U	5,040.00										5,040	100,800
		Weighted Average Hour Rate:			U	30.00										30	
		Resource List UCC to Activity:			U	5,040.00										5,040	100,800
40	2	Change Carbon	5.00	MO									15,000			3,000	15,000
Detaile																	
LIST Cost Detail																	
	Note:	Change carbon monthly															
1.0	UCARCHNG	Carbon Changeouts	5.00	EA	U								3,000.00			3,000	15,000
		UCC to Activity:			U								3,000.00			3,000	15,000
		Resource List UCC to Activity:			U								3,000.00			3,000	15,000
40	3	Night Shift Supervisor	20.00	WK		44,800										2,240	44,800
Detaile																	
LIST Cost Detail																	
	Note:	Night shift supervisor 8 hr/day															
	140.0 Days	0.1429 WK/Da	7.0000 Da/WK				320.00 Cost/Da										
	140.0 Shifts	0.1429 WK/Sh	7.0000 Sh/WK				320.00 Cost/Sh										
	1120.0 Hours	0.0179 WK/Hr	56.0000 Hr/WK				40.00 Cost/Hr										
1.0	LDWNOPER	Dewatering Operator Nite	1,120.00	HR	U	40.00										40	44,800
		UCC to Activity:			U	2,240.00										2,240	44,800
		Weighted Average Hour Rate:			U	40.00										40	
		Resource List UCC to Activity:			U	2,240.00										2,240	44,800
40	4	Electricity for Pumps	5.00	MO									11,309			2,262	11,310
Detaile																	
LIST Cost Detail																	
1.0	UELECTKW	Electricity	3,360.00	HR	U								3.37			3	11,310
		UCC to Activity:			U								2,261.95			2,262	11,310
		Resource List UCC to Activity:			U								2,261.95			2,262	11,310
40	5	Misc. Electric Charge	5.00	MO									1,200.00			240	1,200
Detaile																	
LIST Cost Detail																	
1.0	UMISCELE	Misc. Electric Charge	5.00	MO	U								240.00			240	1,200
		UCC to Activity:			U								240.00			240	1,200
		Resource List UCC to Activity:			U								240.00			240	1,200
40	6	Water Treatment Analysis	5.00	EA									1,500.00			300	1,500
Detaile																	
LIST Cost Detail																	
1.0	UWTRANAL	Water Treatment Analysis	5.00	EA	U								300.00			300	1,500
		UCC to Activity:			U								300.00			300	1,500
		Resource List UCC to Activity:			U								300.00			300	1,500

Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
50		Excavation	1.00	LS		40,631				161,020			246,000			447,651	447,651
Detaile																	
50	1	Exc,Stockpile Soil/DA	41,766	CY		27,227				107,900						3	135,127
Detaile																	
CREW Cost Detail																	
	65.0 Days	642.5538 CY/Da	0.0016 Da/CY				2078.88 Cost/Da										
	65.0 Shifts	642.5538 CY/Sh	0.0016 Sh/CY				2078.88 Cost/Sh										
	520.0 Hours	80.3192 CY/Hr	0.0125 Hr/CY				259.86 Cost/Hr										
	2.0 LWSLOP	Equipment Operator	1,040.00	HR	U	18.86										19	19,614
			UCC to Activity:		U	0.47										0	19,614
	2.0 REXC330	Excavator CAT 325B	1,040.00	HR	U					82.50						83	85,800
			UCC to Activity:		U					2.05						2	85,800
	1.0 LWSLAB	Site Laborer	520.00	HR	U	14.64										15	7,613
			UCC to Activity:		U	0.18										0	7,613
	1.0 RARTDUMP	Articulating Dump Truck	520.00	HR	U					42.50						43	22,100
			UCC to Activity:		U					0.53						1	22,100
		Resource List Hour Rate:			U	52.36				207.50						260	
		Resource List UCC to Activity:			U	0.65				2.58						3	135,127
50	2	Exc,Stockpile Soil/EA	20,384	CY		13,404				53,120						3	66,524
Detaile																	
CREW Cost Detail																	
	32.0 Days	637.0000 CY/Da	0.0016 Da/CY				2078.88 Cost/Da										
	32.0 Shifts	637.0000 CY/Sh	0.0016 Sh/CY				2078.88 Cost/Sh										
	256.0 Hours	79.6250 CY/Hr	0.0126 Hr/CY				259.86 Cost/Hr										
	2.0 LWSLOP	Equipment Operator	512.00	HR	U	18.86										19	9,656
			UCC to Activity:		U	0.47										0	9,656
	2.0 REXC330	Excavator CAT 325B	512.00	HR	U					82.50						83	42,240
			UCC to Activity:		U					2.07						2	42,240
	1.0 LWSLAB	Site Laborer	256.00	HR	U	14.64										15	3,748
			UCC to Activity:		U	0.18										0	3,748
	1.0 RARTDUMP	Articulating Dump Truck	256.00	HR	U					42.50						43	10,880
			UCC to Activity:		U					0.53						1	10,880
		Resource List Hour Rate:			U	52.36				207.50						260	
		Resource List UCC to Activity:			U	0.66				2.61						3	66,524
50	7	Install Cribbing/Walers	6,000.00	SF									246,000			41	246,000
Detaile																	
LIST Cost Detail																	
	1.0 UCRIBWAL	Install Cribbing/Walers	6,000.00	SF	U								41.00			41	246,000
			UCC to Activity:		U								41.00			41	246,000
		Resource List UCC to Activity:			U								41.00			41	246,000
60		Characterization	1.00	LS									199,660		199,660	199,660	
Detaile																	
60	1	Rad Analysis Rad Soils	298.00	EA									119,200			400	119,200
Detaile																	
LIST Cost Detail																	
	1.0 URADANAL	Rad Analysis	298.00	EA	U								400.00			400	119,200
			UCC to Activity:		U								400.00			400	119,200
		Resource List UCC to Activity:			U								400.00			400	119,200
60	2	TCLP Analysis Lead Soil	298.00	EA									80,460			270	80,460
Detaile																	
LIST Cost Detail																	
	1.0 UTCLPAN	TCLP Analysis	298.00	EA	U								270.00			270	80,460
			UCC to Activity:		U								270.00			270	80,460
		Resource List UCC to Activity:			U								270.00			270	80,460
70		Stabilization	1.00	LS		20,944				237,899	132,888		135,753			527,485	527,485
Detaile																	
70	1	Transport Soil Stockpile	24,611	CY		9,634.24				15,640						1	25,274
Detaile																	
CREW Cost Detail																	

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Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
	23.0 Days	1070.044 CY/Da		0.0009	Da/CY			1098.88	Cost/Da									
	23.0 Shifts	1070.044 CY/Sh		0.0009	Sh/CY			1098.88	Cost/Sh									
	184.0 Hours	133.7554 CY/Hr		0.0075	Hr/CY			137.36	Cost/Hr									
	1.0 LWSLAB		Site Laborer	184.00	HR	U	14.64										15	2,694
			UCC to Activity:			U	0.11										0	2,694
	2.0 LWSLOP		Equipment Operator	368.00	HR	U	18.86										19	6,940
			UCC to Activity:			U	0.28										0	6,940
	2.0 RARTDUMP		Articulating Dump Truck	368.00	HR	U					42.50						43	15,640
			UCC to Activity:			U					0.64						1	15,640
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.39				0.64						1	25,274
70	2		Pug Mill Process	24,611	CY						203,899	132,888		106,593			18	443,381
Detaile																		
LIST Cost Detail																		
	1.0 UPUGMOB		Mob/Maintain Pug Mill	1.72	LS	U								18,400			18,400	31,714
			UCC to Activity:			U								1.29			1	31,714
	1.0 UPUGRENT		Pug Mill Rental	8.62	MO	U					9,660.00						9,660	83,249
			UCC to Activity:			U					3.38						3	83,249
	1.0 UPHOSACD		Phosphoric Acid,pH agent	885.92	TN	U						150.00					150	132,888
			UCC to Activity:			U						5.40					5	132,888
	1.0 UACIDPMP		Acid Pump Rental	8.62	MO	U					10,000						10,000	86,179
			UCC to Activity:			U					3.50						4	86,179
	1.0 USTORAGE		Storage of acid,pH red.ag	1.72	LS	U								10,000			10,000	17,236
			UCC to Activity:			U								0.70			1	17,236
	1.0 UPWRPUGM		Power for Pug Mill	1.72	LS	U								15,000			15,000	25,854
			UCC to Activity:			U								1.05			1	25,854
	1.0 UANCEQUP		Ancillary Equip.for Pug	8.62	MO	U					4,000.00						4,000	34,472
			UCC to Activity:			U					1.40						1	34,472
	1.0 ULOADSOL		Load soil into Pug Mill	24,611	CY	U								1.22			1	30,025
			UCC to Activity:			U								1.22			1	30,025
	1.0 ULOADPHS		Load Phosphoric in Pug	576.54	CY	U								1.53			2	882
			UCC to Activity:			U								0.04			0	882
	1.0 ULODPH		Load pH Reduct in Pug	576.54	CY	U								1.53			2	882
			UCC to Activity:			U								0.04			0	882
			Resource List UCC to Activity:			U					8.28	5.40		4.33			18	443,381
70	3		Confirmation Testing	108.00	EA									29,160			270	29,160
Detaile																		
LIST Cost Detail																		
	1.0 UTCLPAN		TCLP Analysis	108.00	EA	U								270.00			270	29,160
			UCC to Activity:			U								270.00			270	29,160
			Resource List UCC to Activity:			U								270.00			270	29,160
70	4		Transport to Stockpile	27,073	CY		11,309				18,360						1	29,670
Detaile																		
CREW Cost Detail																		
	27.0 Days	1002.704 CY/Da		0.0010	Da/CY			1098.88	Cost/Da									
	27.0 Shifts	1002.704 CY/Sh		0.0010	Sh/CY			1098.88	Cost/Sh									
	216.0 Hours	125.3380 CY/Hr		0.0080	Hr/CY			137.36	Cost/Hr									
	1.0 LWSLAB		Site Laborer	216.00	HR	U	14.64										15	3,162
			UCC to Activity:			U	0.12										0	3,162
	2.0 LWSLOP		Equipment Operator	432.00	HR	U	18.86										19	8,148
			UCC to Activity:			U	0.30										0	8,148
	2.0 RARTDUMP		Articulating Dump Truck	432.00	HR	U					42.50						43	18,360
			UCC to Activity:			U					0.68						1	18,360
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.42				0.68						1	29,670
80			Confirmatory Sampling	1.00	LS									144,420			144,420	144,420
Detaile																		
80	1		Confirmatory Sampling	249.00	EA									144,420			580	144,420
Detaile																		
LIST Cost Detail																		
	1.0 URADANAL		Rad Analysis	249.00	EA	U								400.00			400	99,600
			UCC to Activity:			U								400.00			400	99,600
	1.0 UMETLANL		Metals Analysis	249.00	EA	U								180.00			180	44,820
			UCC to Activity:			U								180.00			180	44,820
			Resource List UCC to Activity:			U								580.00			580	144,420

Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
90			Additional Excavation	1.00	LS		1,884.96				7,470.00						9,355	9,355
Detaile																		
90	1		Exc,Stockpile Soil/DA	2,088.00	CY		1,256.64				4,980.00						3	6,237
Detaile																		
CREW Cost Detail																		
	3.0 Days		696.0000 CY/Da	0.0014 Da/CY			2078.88 Cost/Da											
	3.0 Shifts		696.0000 CY/Sh	0.0014 Sh/CY			2078.88 Cost/Sh											
	24.0 Hours		87.0000 CY/Hr	0.0115 Hr/CY			259.86 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	48.00	HR	U	18.86										19	905
				UCC to Activity:		U	0.43										0	905
	2.0	REXC330	Excavator CAT 325B	48.00	HR	U					82.50						83	3,960
				UCC to Activity:		U					1.90						2	3,960
	1.0	LWSLAB	Site Laborer	24.00	HR	U	14.64										15	351
				UCC to Activity:		U	0.17										0	351
	1.0	RARTDUMP	Articulating Dump Truck	24.00	HR	U					42.50						43	1,020
				UCC to Activity:		U					0.49						0	1,020
			Resource List Hour Rate:			U	52.36				207.50						260	
			Resource List UCC to Activity:			U	0.60				2.39						3	6,237
90	2		Exc,Stockpile Soil/EA	1,019.00	CY		628.32				2,490.00						3	3,118
Detaile																		
CREW Cost Detail																		
	1.5 Days		679.3333 CY/Da	0.0015 Da/CY			2078.88 Cost/Da											
	1.5 Shifts		679.3333 CY/Sh	0.0015 Sh/CY			2078.88 Cost/Sh											
	12.0 Hours		84.9167 CY/Hr	0.0118 Hr/CY			259.86 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	24.00	HR	U	18.86										19	453
				UCC to Activity:		U	0.44										0	453
	1.0	LWSLAB	Site Laborer	12.00	HR	U	14.64										15	176
				UCC to Activity:		U	0.17										0	176
	2.0	REXC330	Excavator CAT 325B	24.00	HR	U					82.50						83	1,980
				UCC to Activity:		U					1.94						2	1,980
	1.0	RARTDUMP	Articulating Dump Truck	12.00	HR	U					42.50						43	510
				UCC to Activity:		U					0.50						1	510
			Resource List Hour Rate:			U	52.36				207.50						260	
			Resource List UCC to Activity:			U	0.62				2.44						3	3,118
100			Confirmatory Sampling AE	1.00	LS									6,960.00			6,960	6,960
Detaile																		
100	1		Confirmatory Sampling AE	12.00	EA									6,960.00			580	6,960
Detaile																		
LIST Cost Detail																		
	1.0	URADANAL	Rad Analysis	12.00	EA	U								400.00			400	4,800
				UCC to Activity:		U								400.00			400	4,800
	1.0	UMETLANL	Metals Analysis	12.00	EA	U								180.00			180	2,160
				UCC to Activity:		U								180.00			180	2,160
			Resource List UCC to Activity:			U								580.00			580	6,960
110			T & D Offsi	1.00	LS		33,091				53,720			13949555			14036367	14036367
Detaile																		
110	1		Transport to Stockpile	80,770	CY		33,091				53,720						1	86,812
Detaile																		
CREW Cost Detail																		
	79.0 Days		1022.405 CY/Da	0.0010 Da/CY			1098.88 Cost/Da											
	79.0 Shifts		1022.405 CY/Sh	0.0010 Sh/CY			1098.88 Cost/Sh											
	632.0 Hours		127.8006 CY/Hr	0.0078 Hr/CY			137.36 Cost/Hr											
	1.0	LWSLAB	Site Laborer	632.00	HR	U	14.64										15	9,252
				UCC to Activity:		U	0.11										0	9,252
	2.0	LWSLOP	Equipment Operator	1,264.00	HR	U	18.86										19	23,839
				UCC to Activity:		U	0.30										0	23,839
	2.0	RARTDUMP	Articulating Dump Truck	1,264.00	HR	U					42.50						43	53,720
				UCC to Activity:		U					0.67						1	53,720
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.41				0.67						1	86,812

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ROY F. WESTON, INC.
COLREC2B (Colonie Site Recommend 2B)
Abbreviated Estimator's Report

Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
110 Detaile	2		T & D Subtitle C (LLRW)	1,250.00	CY									311,875			250	311,875
LIST Cost Detail																		
	1.0	UDISPEUT	Disposal Subtitle C(LLRW)	1,250.00	CY	U								149.50			150	186,875
				UCC to Activity:		U								149.50			150	186,875
	1.0	UTRANSPT	Transport by Rail	1,250.00	CY	U								100.00			100	125,000
				UCC to Activity:		U								100.00			100	125,000
			Resource List	UCC to Activity:		U								249.50			250	311,875
110 Detaile	3		T & D Subtitle C (LARW)	79,520	CY									13637680			172	13637680
LIST Cost Detail																		
	1.0	UDISENSF	Disposal Subtitle C(LARW)	79,520	CY	U								71.50			72	5685680
				UCC to Activity:		U								71.50			72	5685680
	1.0	UTRANSPT	Transport by Rail	79,520	CY	U								100.00			100	7952000
				UCC to Activity:		U								100.00			100	7952000
			Resource List	UCC to Activity:		U								171.50			172	13637680
110 Detaile	4		T & D Soils Subtitle D LF	1.00	CY									0.00			0	0
LIST Cost Detail																		
	Note:		1 cy = 1.2 tons															
	1.0	UT&DSUBD	T & D Subtitle D Landfill	0.00	TN	U								45.00			45	0
				UCC to Activity:		U								0.00			0	0
			Resource List	UCC to Activity:		U								0.00			0	0
120 Detaile			Offsite Disposal VOC,SVOC	1.00	LS		62.20				100.97			31,725		31,888	31,888	31,888
120 Detaile	1		Characterization Sampling	10.00	EA									6,000.00			600	6,000
LIST Cost Detail																		
	1.0	UVOCANAL	VOC Analysis	10.00	EA	U								225.00			225	2,250
				UCC to Activity:		U								225.00			225	2,250
	1.0	USVOCANL	SVOC Analysis	10.00	EA	U								375.00			375	3,750
				UCC to Activity:		U								375.00			375	3,750
			Resource List	UCC to Activity:		U								600.00			600	6,000
120 Detaile	2		T & D Soils	150.00	TN									25,725			172	25,725
LIST Cost Detail																		
	1.0	UT&DVOC	T & D VOC Soils	150.00	CY	U								171.50			172	25,725
				UCC to Activity:		U								171.50			172	25,725
			Resource List	UCC to Activity:		U								171.50			172	25,725
120 Detaile	3		Transport to Stockpile	150.00	CY		62.20				100.97						1	163
CREW Cost Detail																		
	0.1 Days		1010.203 CY/Da	0.0010 Da/CY		1098.88 Cost/Da												
	0.1 Shifts		1010.203 CY/Sh	0.0010 Sh/CY		1098.88 Cost/Sh												
	1.2 Hours		126.2754 CY/Hr	0.0079 Hr/CY		137.36 Cost/Hr												
	1.0	LWSLAB	Site Laborer	1.19	HR	U	14.64										15	17
				UCC to Activity:		U	0.12										0	17
	2.0	LWSLOP	Equipment Operator	2.38	HR	U	18.86										19	45
				UCC to Activity:		U	0.30										0	45
	2.0	RARTDUMP	Articulating Dump Truck	2.38	HR	U					42.50						43	101
				UCC to Activity:		U					0.67						1	101
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.41				0.67						1	163
125 Detaile			GW Monitoring Wells	10.00	EA									25,000			2,500	25,000

Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
125	1	GW Monitoring Wells	10.00	EA									25,000			2,500	25,000
Detaile																	
LIST Cost Detail																	
	1.0 UGWELLS	GW Monitoring Wells	10.00	EA	U								2,500.00			2,500	25,000
		UCC to Activity:			U								2,500.00			2,500	25,000
		Resource List UCC to Activity:			U								2,500.00			2,500	25,000
130		Site Restoration	1.00	LS		37,280				133,500	646,047		11,312			828,140	828,140
Detaile																	
130	1	Fill Material	71,783	CY							646,047					9	646,047
Detaile																	
LIST Cost Detail																	
	1.0 MFILLMTL	Fill Material	71,783	CY	U						9.00					9	646,047
		UCC to Activity:			U						9.00					9	646,047
		Resource List UCC to Activity:			U						9.00					9	646,047
130	2	Spread,Compact,Grade Fill	71,783	CY		37,280				133,500						2	170,780
Detaile																	
CREW Cost Detail																	
	89.0 Days	806.5506 CY/Da	0.0012 Da/CY		1918.88 Cost/Da												
	89.0 Shifts	806.5506 CY/Sh	0.0012 Sh/CY		1918.88 Cost/Sh												
	712.0 Hours	100.8188 CY/Hr	0.0099 Hr/CY		239.86 Cost/Hr												
	2.0 LWSLOP	Equipment Operator	1,424.00	HR	U	18.86										19	26,857
		UCC to Activity:			U	0.37										0	26,857
	1.0 LWSLAB	Site Laborer	712.00	HR	U	14.64										15	10,424
		UCC to Activity:			U	0.15										0	10,424
	2.0 RCOMPACT	Compactor CAT CS323C	1,424.00	HR	U					93.75						94	133,500
		UCC to Activity:			U					1.86						2	133,500
		Resource List Hour Rate:			U	52.36				187.50						240	
		Resource List UCC to Activity:			U	0.52				1.86						2	170,780
130	3	Seed Area	12.50	AC									11,312			905	11,313
Detaile																	
LIST Cost Detail																	
	1.0 USEED	Seeding	12.50	AC	U								905.00			905	11,313
		UCC to Activity:			U								905.00			905	11,313
		Resource List UCC to Activity:			U								905.00			905	11,313
140		Demobilize	1.00	LS		5,360.00							15,000			20,360	20,360
Detaile																	
LIST Cost Detail																	
	1.0 UDEMOBTR	Demob Trailers	6.00	EA	U								500.00			500	3,000
		UCC to Activity:			U								3,000.00			3,000	3,000
	1.0 UDEMOBEQ	Demob Equipment	10.00	EA	U								300.00			300	3,000
		UCC to Activity:			U								3,000.00			3,000	3,000
	1.0 UDISMUTL	Dismantle Utilities	1.00	LS	U								6,000.00			6,000	6,000
		UCC to Activity:			U								6,000.00			6,000	6,000
	1.0 UDISPOSL	Disposal of Debris	1.00	LS	U								3,000.00			3,000	3,000
		UCC to Activity:			U								3,000.00			3,000	3,000
		Resource List UCC to Activity:			U								15,000			15,000	15,000
CREW Cost Detail																	
	10.0 Days	0.1000 LS/Da	10.0000 Da/LS		536.00 Cost/Da												
	10.0 Shifts	0.1000 LS/Sh	10.0000 Sh/LS		536.00 Cost/Sh												
	80.0 Hours	0.0125 LS/Hr	80.0000 Hr/LS		67.00 Cost/Hr												
	2.0 LWSLOP	Equipment Operator	160.00	HR	U	18.86										19	3,018
		UCC to Activity:			U	3,017.60										3,018	3,018
	2.0 LWSLAB	Site Laborer	160.00	HR	U	14.64										15	2,342
		UCC to Activity:			U	2,342.40										2,342	2,342
		Resource List Hour Rate:			U	67.00										67	
		Resource List UCC to Activity:			U	5,360.00										5,360	5,360
150		Indirect Construct Cost	1.00	LS									2296152			2296152	2296152
Detaile																	

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Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
150	1	Permit & Legal (5%)	1.00	LS									127,564			127,564	127,564
Detaile																	
LIST Cost Detail																	
1.0	UPERMTLG	Permit & Legal 5%	1.00	LS	U								127,564			127,564	127,564
		UCC to Activity:			U								127,564			127,564	127,564
		Resource List UCC to Activity:			U								127,564			127,564	127,564
150	2	Health & Safety (10%)	1.00	LS									255,128			255,128	255,128
Detaile																	
LIST Cost Detail																	
1.0	UH&S	Health & Safety 10%	1.00	LS	U								255,128			255,128	255,128
		UCC to Activity:			U								255,128			255,128	255,128
		Resource List UCC to Activity:			U								255,128			255,128	255,128
150	3	Construct Management(10%)	1.00	LS									255,128			255,128	255,128
Detaile																	
LIST Cost Detail																	
1.0	UCONMGMT	Construct Management 10%	1.00	LS	U								255,128			255,128	255,128
		UCC to Activity:			U								255,128			255,128	255,128
		Resource List UCC to Activity:			U								255,128			255,128	255,128
150	4	QA & Oversight (10%)	1.00	LS									255,128			255,128	255,128
Detaile																	
LIST Cost Detail																	
1.0	UQA,OVST	QA & Oversight 10%	1.00	LS	U								255,128			255,128	255,128
		UCC to Activity:			U								255,128			255,128	255,128
		Resource List UCC to Activity:			U								255,128			255,128	255,128
150	5	Bid & Scope Conting.(10%)	1.00	LS									255,128			255,128	255,128
Detaile																	
LIST Cost Detail																	
1.0	UBIDSCPE	Bid & Scope Conting. 10%	1.00	LS	U								255,128			255,128	255,128
		UCC to Activity:			U								255,128			255,128	255,128
		Resource List UCC to Activity:			U								255,128			255,128	255,128
150	6	Cert.Consruct.Report (5%)	1.00	LS									127,564			127,564	127,564
Detaile																	
LIST Cost Detail																	
1.0	UCERTCRP	Cert.Construct Report 5%	1.00	LS	U								127,564			127,564	127,564
		UCC to Activity:			U								127,564			127,564	127,564
		Resource List UCC to Activity:			U								127,564			127,564	127,564
150	7	Surveying/GPS (10%)	1.00	LS									255,128			255,128	255,128
Detaile																	
LIST Cost Detail																	
1.0	USURVEYG	Survey/GPS 10%	1.00	LS	U								255,128			255,128	255,128
		UCC to Activity:			U								255,128			255,128	255,128
		Resource List UCC to Activity:			U								255,128			255,128	255,128
150	8	Office Proj. Mgmt (10%)	1.00	LS									255,128			255,128	255,128
Detaile																	
LIST Cost Detail																	
1.0	UPROJMGM	Office Project Manage 10%	1.00	LS	U								255,128			255,128	255,128
		UCC to Activity:			U								255,128			255,128	255,128
		Resource List UCC to Activity:			U								255,128			255,128	255,128
150	9	Miscellaneous (ODCs) (5%)	1.00	LS									127,564			127,564	127,564
Detaile																	
LIST Cost Detail																	
1.0	UMISC	Miscellanous ODC's 5%	1.00	LS	U								127,564			127,564	127,564
		UCC to Activity:			U								127,564			127,564	127,564
		Resource List UCC to Activity:			U								127,564			127,564	127,564

Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
150	10	Health Physics Support-5%	1.00	LS									127,564			127,564	127,564
Detaile																	
LIST Cost Detail																	
1.0	UHEALPHY	Health Physics Sup. 5%	1.00	LS	U								127,564			127,564	127,564
		UCC to Activity:			U								127,564			127,564	127,564
		Resource List UCC to Activity:			U								127,564			127,564	127,564
150	11	Gen.Contingency (10%)	1.00	LS									255,128			255,128	255,128
Detaile																	
LIST Cost Detail																	
1.0	UGENCONT	General Contingency 10%	1.00	LS	U								255,128			255,128	255,128
		UCC to Activity:			U								255,128			255,128	255,128
		Resource List UCC to Activity:			U								255,128			255,128	255,128
200		Post Closure Activity(PW)	1.00	LS									875,876			875,876	875,876
Detaile																	
200	1	Quarterly Monitoring Well	4.00	EA									805,776			201,444	805,776
Detaile																	
LIST Cost Detail																	
1.0	UGWMONOM	GW Monitoring sampling	1.62	LS	U								497,700			497,700	805,776
		UCC to Activity:			U								201,444			201,444	805,776
		Resource List UCC to Activity:			U								201,444			201,444	805,776
200	2	CERCLA Reviews	1.00	LS									70,100			70,100	70,100
Detaile																	
LIST Cost Detail																	
1.0	USUMREPT	Summary Report PresentWth	1.00	LS	U								70,100			70,100	70,100
		UCC to Activity:			U								70,100			70,100	70,100
		Resource List UCC to Activity:			U								70,100			70,100	70,100

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ALTERNATIVE 3B, RECOMMENDED

Job Description: Colonie Site Recommend 3B

Proposal Date:
Time:

From: ROY F. WESTON, INC.

Bid Item Number	Bid Item Description	Quantity	UM	Unit Price	Total Price
10	Mobilization & Site Preparation	1.0000	LS	0.00	**0.00**
20	Buried Drums	25.0000	EA	566.04	**14,151.00**
30	Divert Tributary	1.0000	LS	121,596.00	**121,596.00**
40	Dewater Excavation	1.0000	LS	174,609.76	**174,609.76**
50	Excavation	1.0000	LS	447,651.36	**447,651.36**
60	Characterization of Stockpiled Soils	1.0000	LS	199,660.00	**199,660.00**
70	Stabilization of Lead Soils	1.0000	LS	527,484.55	**527,484.55**
80	Confirmatory Sampling	1.0000	LS	144,420.00	**144,420.00**
90	Additional Excavation	1.0000	LS	12,473.28	**12,473.28**
100	Confirmatory Sampling AE	1.0000	LS	6,960.00	**6,960.00**
110	Onsite Disposal of Soil DA	1.0000	LS	75,460.64	**75,460.64**
120	Construct Composite Cover over DA	1.0000	LS	247,624.89	**247,624.89**
130	Transport & Dispose Offsite	1.0000	LS	8,479,766.52	**8,479,766.52**
140	Offsite Disposal VOC,SVOC	1.0000	LS	31,875.07	**31,875.07**
150	Groundwater Monitoring Wells	10.0000	EA	2,500.00	**25,000.00**
160	Site Restoration	1.0000	LS	826,329.82	**826,329.82**
170	Demobilization	1.0000	LS	20,360.00	**20,360.00**
	Direct Construction Cost			Subtotal Running Total	**11,355,422.89** **11,355,422.89**
190	Indirect Construction Cost	1.0000	LS	2,588,094.00	**2,588,094.00**
	Indirect Construction Cost			Subtotal Running Total	**2,588,094.00** **13,943,516.89**
200	Post Closure Activites (Present Worth)	1.0000	LS	1,266,458.30	**1,266,458.30**
				GRAND TOTAL	**15,209,975.19**

Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
10			Mobilization & Site Prep	1.00	LS													
Detaile																		
20			Buried Drums	25.00	EA		536.00				240.00	4,625.00		8,750.00			566	14,151
Detaile																		
20	1		Repackage Drums	25.00	EA		536.00				240.00	4,625.00					216	5,401
Detaile																		
LIST Cost Detail																		
	1.0	MOVERPAC	Overpac Drums	25.00	EA	U						185.00					185	4,625
			UCC to Activity:			U						185.00					185	4,625
			Resource List UCC to Activity:			U						185.00					185	4,625
CREW Cost Detail																		
	2.0 Days		12.5000 EA/Da	0.0800 Da/EA			388.00 Cost/Da											
	2.0 Shifts		12.5000 EA/Sh	0.0800 Sh/EA			388.00 Cost/Sh											
	16.0 Hours		1.5625 EA/Hr	0.6400 Hr/EA			48.50 Cost/Hr											
	1.0	LWSLAB	Site Laborer	16.00	HR	U	14.64										15	234
			UCC to Activity:			U	9.37										9	234
	1.0	LWSLOP	Equipment Operator	16.00	HR	U	18.86										19	302
			UCC to Activity:			U	12.07										12	302
	1.0	RBACKHOE	Backhoe JD 710	16.00	HR	U					15.00						15	240
			UCC to Activity:			U					9.60						10	240
			Resource List Hour Rate:			U	33.50				15.00						49	
			Resource List UCC to Activity:			U	21.44				9.60						31	776
20	2		Offsite Trans&/Disposal	25.00	EA									8,750.00			350	8,750
Detaile																		
LIST Cost Detail																		
	1.0	UT&DRUM	T&D Envirocare UT Drums	25.00	EA	U								350.00			350	8,750
			UCC to Activity:			U								350.00			350	8,750
			Resource List UCC to Activity:			U								350.00			350	8,750
30			Divert Tributary	1.00	LS		4,556.00				16,440	58,600		42,000			121,596	121,596
Detaile																		
30	1		Divert Pipeline	1,000.00	LF		4,020.00				16,200	58,000		42,000			120	120,220
Detaile																		
LIST Cost Detail																		
	1.0	UHORZBOR	Horizontal Boring	100.00	LF	U								420.00			420	42,000
			UCC to Activity:			U								42.00			42	42,000
	1.0	M4'DPIPE	4'dia. pipe	1,000.00	LF	U						58.00					58	58,000
			UCC to Activity:			U						58.00					58	58,000
			Resource List UCC to Activity:			U						58.00		42.00			100	100,000
CREW Cost Detail																		
	Note:		Excavate & Backfill for new pipe. Horizontal Bore under Railroad Tracks.															
	15.0 Days		66.6667 LF/Da	0.0150 Da/LF			1348.00 Cost/Da											
	15.0 Shifts		66.6667 LF/Sh	0.0150 Sh/LF			1348.00 Cost/Sh											
	120.0 Hours		8.3333 LF/Hr	0.1200 Hr/LF			168.50 Cost/Hr											
	1.0	LWSLAB	Site Laborer	120.00	HR	U	14.64										15	1,757
			UCC to Activity:			U	1.76										2	1,757
	1.0	LWSLOP	Equipment Operator	120.00	HR	U	18.86										19	2,263
			UCC to Activity:			U	2.26										2	2,263
	1.0	RBACKHOE	Backhoe JD 710	120.00	HR	U					15.00						15	1,800
			UCC to Activity:			U					1.80						2	1,800
	1.0	RCRANE	Crane W/Operator	120.00	HR	U					120.00						120	14,400
			UCC to Activity:			U					14.40						14	14,400
			Resource List Hour Rate:			U	33.50				135.00						169	
			Resource List UCC to Activity:			U	4.02				16.20						20	20,220
30	2		Plug & Abandon Ex.Culvert	2.00	EA		536.00				240.00	600.00					688	1,376
Detaile																		
LIST Cost Detail																		
	1.0	MPLUGS	48" Pluge	2.00	EA	U						300.00					300	600
			UCC to Activity:			U						300.00					300	600
			Resource List UCC to Activity:			U						300.00					300	600
CREW Cost Detail																		

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Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
	2.0 Days	1.0000 EA/Da	1.0000 Da/EA				388.00 Cost/Da										
	2.0 Shifts	1.0000 EA/Sh	1.0000 Sh/EA				388.00 Cost/Sh										
	16.0 Hours	0.1250 EA/Hr	8.0000 Hr/EA				48.50 Cost/Hr										
1.0	LWSLAB	Site Laborer	16.00	HR	U	14.64										15	234
		UCC to Activity:			U	117.12										117	234
1.0	LWSLOP	Equipment Operator	16.00	HR	U	18.86										19	302
		UCC to Activity:			U	150.88										151	302
1.0	RBACKHOE	Backhoe JD 710	16.00	HR	U					15.00						15	240
		UCC to Activity:			U					120.00						120	240
		Resource List Hour Rate:			U	33.50				15.00						49	
		Resource List UCC to Activity:			U	268.00				120.00						388	776
40		Dewater Excavation	1.00	LS		145,600							29,009			174,610	174,610
Detaile																	
40	1	Operator 24hr/day	20.00	WK		100,800										5,040	100,800
Detaile																	
LIST Cost Detail																	
Note:		Operate 24 hous/day															
420.0 Days		0.0476 WK/Da	21.0000 Da/WK				240.00 Cost/Da										
420.0 Shifts		0.0476 WK/Sh	21.0000 Sh/WK				240.00 Cost/Sh										
3360.0 Hours		0.0060 WK/Hr	168.0000 Hr/WK				30.00 Cost/Hr										
1.0	LDWOPER	Dewatering Operator	3,360.00	HR	U	30.00										30	100,800
		UCC to Activity:			U	5,040.00										5,040	100,800
		Weighted Average Hour Rate:			U	30.00										30	
		Resource List UCC to Activity:			U	5,040.00										5,040	100,800
40	2	Change Carbon	5.00	MO									15,000			3,000	15,000
Detaile																	
LIST Cost Detail																	
Note:		Change carbon monthly															
1.0	UCARCHNG	Carbon Changeouts	5.00	EA	U								3,000.00			3,000	15,000
		UCC to Activity:			U								3,000.00			3,000	15,000
		Resource List UCC to Activity:			U								3,000.00			3,000	15,000
40	3	Night Shift Supervisor	20.00	WK		44,800										2,240	44,800
Detaile																	
LIST Cost Detail																	
Note:		Night shift supervisor 8 hr/day															
140.0 Days		0.1429 WK/Da	7.0000 Da/WK				320.00 Cost/Da										
140.0 Shifts		0.1429 WK/Sh	7.0000 Sh/WK				320.00 Cost/Sh										
1120.0 Hours		0.0179 WK/Hr	56.0000 Hr/WK				40.00 Cost/Hr										
1.0	LDWNOPER	Dewatering Operator Nite	1,120.00	HR	U	40.00										40	44,800
		UCC to Activity:			U	2,240.00										2,240	44,800
		Weighted Average Hour Rate:			U	40.00										40	
		Resource List UCC to Activity:			U	2,240.00										2,240	44,800
40	4	Electricity for Pumps	5.00	MO									11,309			2,262	11,310
Detaile																	
LIST Cost Detail																	
1.0	UELECTKW	Electricity	3,360.00	HR	U								3.37			3	11,310
		UCC to Activity:			U								2,261.95			2,262	11,310
		Resource List UCC to Activity:			U								2,261.95			2,262	11,310
40	5	Misc. Electric Charge	5.00	MO									1,200.00			240	1,200
Detaile																	
LIST Cost Detail																	
1.0	UMISCELE	Misc. Electric Charge	5.00	MO	U								240.00			240	1,200
		UCC to Activity:			U								240.00			240	1,200
		Resource List UCC to Activity:			U								240.00			240	1,200
40	6	Water Treatment Analysis	5.00	EA									1,500.00			300	1,500
Detaile																	
LIST Cost Detail																	
1.0	UWTRANAL	Water Treatment Analysis	5.00	EA	U								300.00			300	1,500
		UCC to Activity:			U								300.00			300	1,500
		Resource List UCC to Activity:			U								300.00			300	1,500

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Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
50		Excavation	1.00	LS		40,631				161,020			246,000			447,651	447,651
Detaile																	
50	1	Exc,Stockpile Soil/DA	41,766	CY		27,227				107,900						3	135,127
Detaile																	
CREW Cost Detail																	
	65.0 Days	642.5538 CY/Da	0.0016 Da/CY				2078.88 Cost/Da										
	65.0 Shifts	642.5538 CY/Sh	0.0016 Sh/CY				2078.88 Cost/Sh										
	520.0 Hours	80.3192 CY/Hr	0.0125 Hr/CY				259.86 Cost/Hr										
	2.0 LWSLOP	Equipment Operator	1,040.00	HR	U	18.86										19	19,614
			UCC to Activity:		U	0.47										0	19,614
	2.0 REXC330	Excavator CAT 325B	1,040.00	HR	U					82.50						83	85,800
			UCC to Activity:		U					2.05						2	85,800
	1.0 LWSLAB	Site Laborer	520.00	HR	U	14.64										15	7,613
			UCC to Activity:		U	0.18										0	7,613
	1.0 RARTDUMP	Articulating Dump Truck	520.00	HR	U					42.50						43	22,100
			UCC to Activity:		U					0.53						1	22,100
		Resource List Hour Rate:			U	52.36				207.50						260	
		Resource List UCC to Activity:			U	0.65				2.58						3	135,127
50	2	Exc,Stockpile Soil/EA	20,384	CY		13,404				53,120						3	66,524
Detaile																	
CREW Cost Detail																	
	32.0 Days	637.0000 CY/Da	0.0016 Da/CY				2078.88 Cost/Da										
	32.0 Shifts	637.0000 CY/Sh	0.0016 Sh/CY				2078.88 Cost/Sh										
	256.0 Hours	79.6250 CY/Hr	0.0126 Hr/CY				259.86 Cost/Hr										
	2.0 LWSLOP	Equipment Operator	512.00	HR	U	18.86										19	9,656
			UCC to Activity:		U	0.47										0	9,656
	2.0 REXC330	Excavator CAT 325B	512.00	HR	U					82.50						83	42,240
			UCC to Activity:		U					2.07						2	42,240
	1.0 LWSLAB	Site Laborer	256.00	HR	U	14.64										15	3,748
			UCC to Activity:		U	0.18										0	3,748
	1.0 RARTDUMP	Articulating Dump Truck	256.00	HR	U					42.50						43	10,880
			UCC to Activity:		U					0.53						1	10,880
		Resource List Hour Rate:			U	52.36				207.50						260	
		Resource List UCC to Activity:			U	0.66				2.61						3	66,524
50	7	Install Cribbing/Walers	6,000.00	SF									246,000			41	246,000
Detaile																	
LIST Cost Detail																	
	1.0 UCRIBWAL	Install Cribbing/Walers	6,000.00	SF	U								41.00			41	246,000
			UCC to Activity:		U								41.00			41	246,000
		Resource List UCC to Activity:			U								41.00			41	246,000
60		Characterization	1.00	LS									199,660			199,660	199,660
Detaile																	
60	1	Rad Analysis Rad Soils	298.00	EA									119,200			400	119,200
Detaile																	
LIST Cost Detail																	
	1.0 URADANAL	Rad Analysis	298.00	EA	U								400.00			400	119,200
			UCC to Activity:		U								400.00			400	119,200
		Resource List UCC to Activity:			U								400.00			400	119,200
60	2	TCLP Analysis Lead Soil	298.00	EA									80,460			270	80,460
Detaile																	
LIST Cost Detail																	
	1.0 UTCLPAN	TCLP Analysis	298.00	EA	U								270.00			270	80,460
			UCC to Activity:		U								270.00			270	80,460
		Resource List UCC to Activity:			U								270.00			270	80,460
70		Stabilization	1.00	LS		20,944				237,899	132,888		135,753			527,485	527,485
Detaile																	
70	1	Transport Soil Stockpile	24,611	CY		9,634.24				15,640						1	25,274
Detaile																	
CREW Cost Detail																	

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Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
		23.0 Days	1070.044 CY/Da	0.0009 Da/CY				1098.88 Cost/Da										
		23.0 Shifts	1070.044 CY/Sh	0.0009 Sh/CY				1098.88 Cost/Sh										
		184.0 Hours	133.7554 CY/Hr	0.0075 Hr/CY				137.36 Cost/Hr										
	1.0	LWSLAB	Site Laborer	184.00	HR	U	14.64										15	2,694
				UCC to Activity:		U	0.11										0	2,694
	2.0	LWSLOP	Equipment Operator	368.00	HR	U	18.86										19	6,940
				UCC to Activity:		U	0.28										0	6,940
	2.0	RARTDUMP	Articulating Dump Truck	368.00	HR	U					42.50						43	15,640
				UCC to Activity:		U					0.64						1	15,640
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.39				0.64						1	25,274
70	2		Pug Mill Process	24,611	CY						203,899	132,888		106,593			18	443,381
Detaile																		
LIST Cost Detail																		
	1.0	UPUGMOB	Mob/Maintain Pug Mill	1.72	LS	U								18,400			18,400	31,714
				UCC to Activity:		U								1.29			1	31,714
	1.0	UPUGRENT	Pug Mill Rental	8.62	MO	U					9,660.00						9,660	83,249
				UCC to Activity:		U					3.38						3	83,249
	1.0	UPHOSACD	Phosphoric Acid,pH agent	885.92	TN	U						150.00					150	132,888
				UCC to Activity:		U						5.40					5	132,888
	1.0	UACIDPMP	Acid Pump Rental	8.62	MO	U					10,000						10,000	86,179
				UCC to Activity:		U					3.50						4	86,179
	1.0	USTORAGE	Storage of acid,pH red.ag	1.72	LS	U								10,000			10,000	17,236
				UCC to Activity:		U								0.70			1	17,236
	1.0	UPWRPUGM	Power for Pug Mill	1.72	LS	U								15,000			15,000	25,854
				UCC to Activity:		U								1.05			1	25,854
	1.0	UANCEQUP	Ancillary Equip.for Pug	8.62	MO	U					4,000.00						4,000	34,472
				UCC to Activity:		U					1.40						1	34,472
	1.0	ULOADSOL	Load soil into Pug Mill	24,611	CY	U								1.22			1	30,025
				UCC to Activity:		U								1.22			1	30,025
	1.0	ULOADPHS	Load Phosphoric in Pug	576.54	CY	U								1.53			2	882
				UCC to Activity:		U								0.04			0	882
	1.0	ULODPH	Load pH Reduct in Pug	576.54	CY	U								1.53			2	882
				UCC to Activity:		U								0.04			0	882
			Resource List UCC to Activity:			U					8.28	5.40		4.33			18	443,381
70	3		Confirmation Testing	108.00	EA									29,160			270	29,160
Detaile																		
LIST Cost Detail																		
	1.0	UTCLPAN	TCLP Analysis	108.00	EA	U								270.00			270	29,160
				UCC to Activity:		U								270.00			270	29,160
			Resource List UCC to Activity:			U								270.00			270	29,160
70	4		Transport to Stockpile	27,073	CY		11,309				18,360						1	29,670
Detaile																		
CREW Cost Detail																		
		27.0 Days	1002.704 CY/Da	0.0010 Da/CY				1098.88 Cost/Da										
		27.0 Shifts	1002.704 CY/Sh	0.0010 Sh/CY				1098.88 Cost/Sh										
		216.0 Hours	125.3380 CY/Hr	0.0080 Hr/CY				137.36 Cost/Hr										
	1.0	LWSLAB	Site Laborer	216.00	HR	U	14.64										15	3,162
				UCC to Activity:		U	0.12										0	3,162
	2.0	LWSLOP	Equipment Operator	432.00	HR	U	18.86										19	8,148
				UCC to Activity:		U	0.30										0	8,148
	2.0	RARTDUMP	Articulating Dump Truck	432.00	HR	U					42.50						43	18,360
				UCC to Activity:		U					0.68						1	18,360
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.42				0.68						1	29,670
80			Confirmatory Sampling	1.00	LS									144,420			144,420	144,420
Detaile																		
80	1		Confirmatory Sampling	249.00	EA									144,420			580	144,420
Detaile																		
LIST Cost Detail																		
	1.0	URADANAL	Rad Analysis	249.00	EA	U								400.00			400	99,600
				UCC to Activity:		U								400.00			400	99,600
	1.0	UMETALAN	Metals Analysis	249.00	EA	U								180.00			180	44,820
				UCC to Activity:		U								180.00			180	44,820
			Resource List UCC to Activity:			U								580.00			580	144,420

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Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
90			Additional Excavation	1.00	LS		2,513.28				9,960.00						12,473	12,473
Detaile																		
90	1		Exc,Stockpile Soil/DA	2,088.00	CY		1,675.52				6,640.00						4	8,316
Detaile																		
CREW Cost Detail																		
	4.0 Days		522.0000 CY/Da	0.0019 Da/CY			2078.88 Cost/Da											
	4.0 Shifts		522.0000 CY/Sh	0.0019 Sh/CY			2078.88 Cost/Sh											
	32.0 Hours		65.2500 CY/Hr	0.0153 Hr/CY			259.86 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	64.00	HR	U	18.86										19	1,207
				UCC to Activity:		U	0.58										1	1,207
	2.0	REXC330	Excavator CAT 325B	64.00	HR	U					82.50						83	5,280
				UCC to Activity:		U					2.53						3	5,280
	1.0	LWSLAB	Site Laborer	32.00	HR	U	14.64										15	468
				UCC to Activity:		U	0.22										0	468
	1.0	RARTDUMP	Articulating Dump Truck	32.00	HR	U					42.50						43	1,360
				UCC to Activity:		U					0.65						1	1,360
			Resource List Hour Rate:			U	52.36				207.50						260	
			Resource List UCC to Activity:			U	0.80				3.18						4	8,316
90	2		Exc,Stockpile Soil/EA	1,019.00	CY		837.76				3,320.00						4	4,158
Detaile																		
CREW Cost Detail																		
	2.0 Days		509.5000 CY/Da	0.0020 Da/CY			2078.88 Cost/Da											
	2.0 Shifts		509.5000 CY/Sh	0.0020 Sh/CY			2078.88 Cost/Sh											
	16.0 Hours		63.6875 CY/Hr	0.0157 Hr/CY			259.86 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	32.00	HR	U	18.86										19	604
				UCC to Activity:		U	0.59										1	604
	1.0	LWSLAB	Site Laborer	16.00	HR	U	14.64										15	234
				UCC to Activity:		U	0.23										0	234
	2.0	REXC330	Excavator CAT 325B	32.00	HR	U					82.50						83	2,640
				UCC to Activity:		U					2.59						3	2,640
	1.0	RARTDUMP	Articulating Dump Truck	16.00	HR	U					42.50						43	680
				UCC to Activity:		U					0.67						1	680
			Resource List Hour Rate:			U	52.36				207.50						260	
			Resource List UCC to Activity:			U	0.82				3.26						4	4,158
100			Confirmatory Sampling AE	1.00	LS									6,960.00			6,960	6,960
Detaile																		
100	1		Confirmatory Sampling AE	12.00	EA						6,960.00						580	6,960
Detaile																		
LIST Cost Detail																		
	1.0	URADANAL	Rad Analysis	12.00	EA	U					400.00						400	4,800
				UCC to Activity:		U					400.00						400	4,800
	1.0	UMETALAN	Metals Analysis	12.00	EA	U					180.00						180	2,160
				UCC to Activity:		U					180.00						180	2,160
			Resource List UCC to Activity:			U					580.00						580	6,960
110			Onsite Disposal Soil DA	1.00	LS		22,200				53,260						75,461	75,461
Detaile																		
110	1		Transport from Stockpile	32,400	CY		13,404				21,760						1	35,164
Detaile																		
CREW Cost Detail																		
	32.0 Days		1012.500 CY/Da	0.0010 Da/CY			1098.88 Cost/Da											
	32.0 Shifts		1012.500 CY/Sh	0.0010 Sh/CY			1098.88 Cost/Sh											
	256.0 Hours		126.5625 CY/Hr	0.0079 Hr/CY			137.36 Cost/Hr											
	1.0	LWSLAB	Site Laborer	256.00	HR	U	14.64										15	3,748
				UCC to Activity:		U	0.12										0	3,748
	2.0	LWSLOP	Equipment Operator	512.00	HR	U	18.86										19	9,656
				UCC to Activity:		U	0.30										0	9,656
	2.0	RARTDUMP	Articulating Dump Truck	512.00	HR	U					42.50						43	21,760
				UCC to Activity:		U					0.67						1	21,760
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.41				0.67						1	35,164

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Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
110	2	Place & Compact Soil	32,400	CY		8,796.48				31,500						1	40,296
Detaile																	
CREW Cost Detail																	
21.0 Days		1542.857 CY/Da	0.0006 Da/CY			1918.88 Cost/Da											
21.0 Shifts		1542.857 CY/Sh	0.0006 Sh/CY			1918.88 Cost/Sh											
168.0 Hours		192.8571 CY/Hr	0.0052 Hr/CY			239.86 Cost/Hr											
2.0	LWSLOP	Equipment Operator	336.00	HR	U	18.86										19	6,337
		UCC to Activity:			U	0.20										0	6,337
1.0	LWSLAB	Site Laborer	168.00	HR	U	14.64										15	2,460
		UCC to Activity:			U	0.08										0	2,460
2.0	RCOMPACT	Compactor CAT CS323C	336.00	HR	U					93.75						94	31,500
		UCC to Activity:			U					0.97						1	31,500
		Resource List Hour Rate:			U	52.36				187.50						240	
		Resource List UCC to Activity:			U	0.27				0.97						1	40,296
120		Composite Cover DA	1.00	LS		8,981.19				17,706	180,937		39,998			247,625	247,625
Detaile																	
120	1	18" Compacted Clay	4,269.00	CY		1,882.31				5,706.98	34,152					10	41,741
Detaile																	
LIST Cost Detail																	
1.0	MCLAY	Clay	4,269.00	CY	U						8.00					8	34,152
		UCC to Activity:			U						8.00					8	34,152
		Resource List UCC to Activity:			U						8.00					8	34,152
CREW Cost Detail																	
4.5 Days		950.0000 CY/Da	0.0011 Da/CY			1688.88 Cost/Da											
4.5 Shifts		950.0000 CY/Sh	0.0011 Sh/CY			1688.88 Cost/Sh											
35.9 Hours		118.7500 CY/Hr	0.0084 Hr/CY			211.11 Cost/Hr											
2.0	LWSLOP	Equipment Operator	71.90	HR	U	18.86										19	1,356
		UCC to Activity:			U	0.32										0	1,356
1.0	RDOZERD8	CAT D-8 Dozer	35.95	HR	U					65.00						65	2,337
		UCC to Activity:			U					0.55						1	2,337
1.0	LWSLAB	Site Laborer	35.95	HR	U	14.64										15	526
		UCC to Activity:			U	0.12										0	526
1.0	RCOMPACT	Compactor CAT CS323C	35.95	HR	U					93.75						94	3,370
		UCC to Activity:			U					0.79						1	3,370
		Resource List Hour Rate:			U	52.36				158.75						211	
		Resource List UCC to Activity:			U	0.44				1.34						2	7,589
120	2	12oz Non-Woven Geotextile	83,888	SF		1,405.44					17,616					0	19,022
Detaile																	
LIST Cost Detail																	
1.0	MGEOTEXT	Geotextile Fabric	83,888	SF	U						0.21					0	17,616
		UCC to Activity:			U						0.21					0	17,616
		Resource List UCC to Activity:			U						0.21					0	17,616
CREW Cost Detail																	
6.0 Days		13981.33 SF/Da	0.0001 Da/SF			234.24 Cost/Da											
6.0 Shifts		13981.33 SF/Sh	0.0001 Sh/SF			234.24 Cost/Sh											
48.0 Hours		1747.667 SF/Hr	0.0006 Hr/SF			29.28 Cost/Hr											
2.0	LWSLAB	Site Laborer	96.00	HR	U	14.64										15	1,405
		UCC to Activity:			U	0.02										0	1,405
		Resource List Hour Rate:			U	29.28										29	
		Resource List UCC to Activity:			U	0.02										0	1,405
120	3	40mil PVC Geomembrane	83,888	SF									35,232			0	35,233
Detaile																	
LIST Cost Detail																	
1.0	U40MILNR	40 mil Liner	83,888	SF	U								0.42			0	35,233
		UCC to Activity:			U								0.42			0	35,233
		Resource List UCC to Activity:			U								0.42			0	35,233

Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
120	4		Drainage Net	83,888	SF		936.96					8,388.80					0	9,326
Detaile																		
LIST Cost Detail																		
	1.0	MDRAINET	Drainage Net	83,888	SF	U						0.10					0	8,389
			UCC to Activity:			U						0.10					0	8,389
			Resource List UCC to Activity:			U						0.10					0	8,389
CREW Cost Detail																		
	4.0 Days		20972.00 SF/Da	0.0000 Da/SF			234.24 Cost/Da											
	4.0 Shifts		20972.00 SF/Sh	0.0000 Sh/SF			234.24 Cost/Sh											
	32.0 Hours		2621.500 SF/Hr	0.0004 Hr/SF			29.28 Cost/Hr											
	2.0	LWSLAB	Site Laborer	64.00	HR	U	14.64										15	937
			UCC to Activity:			U	0.01										0	937
			Resource List Hour Rate:			U	29.28										29	
			Resource List UCC to Activity:			U	0.01										0	937
120	5		6oz Non-Woven Geotextile	83,888	SF		1,405.44					17,616					0	19,022
Detaile																		
LIST Cost Detail																		
	1.0	MGEOTEXT	Geotextile Fabric	83,888	SF	U						0.21					0	17,616
			UCC to Activity:			U						0.21					0	17,616
			Resource List UCC to Activity:			U						0.21					0	17,616
CREW Cost Detail																		
	6.0 Days		13981.33 SF/Da	0.0001 Da/SF			234.24 Cost/Da											
	6.0 Shifts		13981.33 SF/Sh	0.0001 Sh/SF			234.24 Cost/Sh											
	48.0 Hours		1747.667 SF/Hr	0.0006 Hr/SF			29.28 Cost/Hr											
	2.0	LWSLAB	Site Laborer	96.00	HR	U	14.64										15	1,405
			UCC to Activity:			U	0.02										0	1,405
			Resource List Hour Rate:			U	29.28										29	
			Resource List UCC to Activity:			U	0.02										0	1,405
120	6		Barrier Protection Soil	6,214.00	CY		2,513.28				9,000.00	78,300					14	89,813
Detaile																		
LIST Cost Detail																		
	1.0	MFILLMTL	Fill Material	8,700.00	CY	U						9.00					9	78,300
			UCC to Activity:			U						12.60					13	78,300
			Resource List UCC to Activity:			U						12.60					13	78,300
CREW Cost Detail																		
	6.0 Days		1035.667 CY/Da	0.0010 Da/CY			1918.88 Cost/Da											
	6.0 Shifts		1035.667 CY/Sh	0.0010 Sh/CY			1918.88 Cost/Sh											
	48.0 Hours		129.4583 CY/Hr	0.0077 Hr/CY			239.86 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	96.00	HR	U	18.86										19	1,811
			UCC to Activity:			U	0.29										0	1,811
	1.0	LWSLAB	Site Laborer	48.00	HR	U	14.64										15	703
			UCC to Activity:			U	0.11										0	703
	2.0	RCOMPACT	Compactor CAT CS323C	96.00	HR	U					93.75						94	9,000
			UCC to Activity:			U					1.45						1	9,000
			Resource List Hour Rate:			U	52.36				187.50						240	
			Resource List UCC to Activity:			U	0.40				1.45						2	11,513
120	7		Topsoil	1,554.00	CY		837.76				3,000.00	24,864					18	28,702
Detaile																		
LIST Cost Detail																		
	1.0	MTOPSOIL	Topsoil	1,554.00	CY	U						16.00					16	24,864
			UCC to Activity:			U						16.00					16	24,864
			Resource List UCC to Activity:			U						16.00					16	24,864
CREW Cost Detail																		
	2.0 Days		777.0000 CY/Da	0.0013 Da/CY			1918.88 Cost/Da											
	2.0 Shifts		777.0000 CY/Sh	0.0013 Sh/CY			1918.88 Cost/Sh											
	16.0 Hours		97.1250 CY/Hr	0.0103 Hr/CY			239.86 Cost/Hr											

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Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
	2.0	LWSLOP	Equipment Operator	32.00	HR	U	18.86										19	604
			UCC to Activity:			U	0.39										0	604
	1.0	LWSLAB	Site Laborer	16.00	HR	U	14.64										15	234
			UCC to Activity:			U	0.15										0	234
	2.0	RCOMPACT	Compactor CAT CS323C	32.00	HR	U					93.75						94	3,000
			UCC to Activity:			U					1.93						2	3,000
			Resource List Hour Rate:			U	52.36				187.50						240	
			Resource List UCC to Activity:			U	0.54				1.93						2	3,838
120	8		Vegetative Cover	85,788	SF									4,766.00			0	4,766
Detaile																		
LIST Cost Detail																		
	1.0	USEEDING	Seeding	9,532.00	SY	U								0.50			1	4,766
			UCC to Activity:			U								0.06			0	4,766
			Resource List UCC to Activity:			U								0.06			0	4,766
130			T & D Offsite	1.00	LS		33,091				53,720			8392955			8479767	8479767
Detaile																		
130	1		Transport from Stockpile	80,770	CY		33,091				53,720						1	86,812
Detaile																		
CREW Cost Detail																		
	79.0 Days		1022.405 CY/Da		0.0010 Da/CY		1098.88 Cost/Da											
	79.0 Shifts		1022.405 CY/Sh		0.0010 Sh/CY		1098.88 Cost/Sh											
	632.0 Hours		127.8006 CY/Hr		0.0078 Hr/CY		137.36 Cost/Hr											
	1.0	LWSLAB	Site Laborer	632.00	HR	U	14.64										15	9,252
			UCC to Activity:			U	0.11										0	9,252
	2.0	LWSLOP	Equipment Operator	1,264.00	HR	U	18.86										19	23,839
			UCC to Activity:			U	0.30										0	23,839
	2.0	RARTDUMP	Articulating Dump Truck	1,264.00	HR	U					42.50						43	53,720
			UCC to Activity:			U					0.67						1	53,720
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.41				0.67						1	86,812
130	2		T & D Subtitle C (LLRW)	1,250.00	CY									311,875			250	311,875
Detaile																		
LIST Cost Detail																		
	Note:		1cy = 1.2tons															
	1.0	UDISPEUT	Disposal Subtitle C(LLRW)	1,250.00	CY	U								149.50			150	186,875
			UCC to Activity:			U								149.50			150	186,875
	1.0	UTRANSPT	Transport by Rail	1,250.00	CY	U								100.00			100	125,000
			UCC to Activity:			U								100.00			100	125,000
			Resource List UCC to Activity:			U								249.50			250	311,875
130	3		T & D Subtitle C (LARM)	47,120	CY									8081080			172	*8081080*
Detaile																		
LIST Cost Detail																		
	Note:		1cy = 1.2tons															
	1.0	UDISENSF	Disposal Subtitle C(LARM)	47,120	CY	U								71.50			72	3369080
			UCC to Activity:			U								71.50			72	3369080
	1.0	UTRANSPT	Transport by Rail	47,120	CY	U								100.00			100	4712000
			UCC to Activity:			U								100.00			100	4712000
			Resource List UCC to Activity:			U								171.50			172	8081080
130	4		T & D Soils Subtitle D LF	1.00	CY									0.00			0	0
Detaile																		
LIST Cost Detail																		
	Note:		1 cy = 1.2 tons															
	1.0	UT&DVOC	T & D VOC Soils	0.00	TN	U								45.00			45	0
			UCC to Activity:			U								0.00			0	0
			Resource List UCC to Activity:			U								0.00			0	0
140			Offsite Disposal VOC,SVOC	1.00	LS		57.20				92.86			31,725			31,875	31,875
Detaile																		

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Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownership	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
140	1		Characterization Sampling	10.00	EA									6,000.00			600	6,000
Detaile																		
LIST Cost Detail																		
	1.0	UVOCANAL	VOC Analysis	10.00	EA	U								225.00			225	2,250
				UCC to Activity:		U								225.00			225	2,250
	1.0	USVOCANL	SVOC Analysis	10.00	EA	U								375.00			375	3,750
				UCC to Activity:		U								375.00			375	3,750
			Resource List UCC to Activity:			U								600.00			600	6,000
140	2		T & D Soils	150.00	TN									25,725			172	25,725
Detaile																		
LIST Cost Detail																		
	1.0	UT&DSUBD	T & D Subtitle D Landfill	150.00	TN	U								171.50			172	25,725
				UCC to Activity:		U								171.50			172	25,725
			Resource List UCC to Activity:			U								171.50			172	25,725
140	3		Transport to stockpile	150.00	CY		57.20				92.86						1	150
Detaile																		
CREW Cost Detail																		
	0.1 Days		1098.385 CY/Da	0.0009 Da/CY		1098.88 Cost/Da												
	0.1 Shifts		1098.385 CY/Sh	0.0009 Sh/CY		1098.88 Cost/Sh												
	1.1 Hours		137.2981 CY/Hr	0.0073 Hr/CY		137.36 Cost/Hr												
	1.0	LWSLAB	Site Laborer	1.09	HR	U	14.64										15	16
				UCC to Activity:		U	0.11										0	16
	2.0	LWSLOP	Equipment Operator	2.19	HR	U	18.86										19	41
				UCC to Activity:		U	0.27										0	41
	2.0	RARTDUMP	Articulating Dump Truck	2.19	HR	U					42.50						43	93
				UCC to Activity:		U					0.62						1	93
			Resource List Hour Rate:			U	52.36				85.00						137	
			Resource List UCC to Activity:			U	0.38				0.62						1	150
150			GW Monitoring Wells	10.00	EA									25,000			2,500	25,000
Detaile																		
150	1		GW Monitoring Wells	10.00	EA									25,000			2,500	25,000
Detaile																		
LIST Cost Detail																		
	1.0	UGWELLS	GW Monitoring Wells	10.00	EA	U								2,500.00			2,500	25,000
				UCC to Activity:		U								2,500.00			2,500	25,000
			Resource List UCC to Activity:			U								2,500.00			2,500	25,000
160			Site Restoration EA	1.00	LS		37,280				133,500	646,047		9,502.50			826,330	826,330
Detaile																		
160	1		Fill Material	71,783	CY							646,047					9	646,047
Detaile																		
LIST Cost Detail																		
	1.0	MFILLMTL	Fill Material	71,783	CY	U						9.00					9	646,047
				UCC to Activity:		U						9.00					9	646,047
			Resource List UCC to Activity:			U						9.00					9	646,047
160	2		Spread,Compact,Grade Fill	71,783	CY		37,280				133,500						2	170,780
Detaile																		
CREW Cost Detail																		
	89.0 Days		806.5506 CY/Da	0.0012 Da/CY		1918.88 Cost/Da												
	89.0 Shifts		806.5506 CY/Sh	0.0012 Sh/CY		1918.88 Cost/Sh												
	712.0 Hours		100.8188 CY/Hr	0.0099 Hr/CY		239.86 Cost/Hr												
	2.0	LWSLOP	Equipment Operator	1,424.00	HR	U	18.86										19	26,857
				UCC to Activity:		U	0.37										0	26,857
	1.0	LWSLAB	Site Laborer	712.00	HR	U	14.64										15	10,424
				UCC to Activity:		U	0.15										0	10,424
	2.0	RCOMPACT	Compactor CAT CS323C	1,424.00	HR	U					93.75						94	133,500
				UCC to Activity:		U					1.86						2	133,500
			Resource List Hour Rate:			U	52.36				187.50						240	
			Resource List UCC to Activity:			U	0.52				1.86						2	170,780

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Code			Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
160	3		Seed Area	10.50	AC									9,502.50			905	9,503
Detaile																		
LIST Cost Detail																		
	1.0	USEED	Seeding	10.50	AC	U								905.00			905	9,503
					UCC to Activity:	U								905.00			905	9,503
			Resource List		UCC to Activity:	U								905.00			905	9,503
170			Demobilization	1.00	LS		5,360.00							15,000			20,360	20,360
Detaile																		
LIST Cost Detail																		
	1.0	UDEMOBTR	Demob Trailers	6.00	EA	U								500.00			500	3,000
					UCC to Activity:	U								3,000.00			3,000	3,000
	1.0	UDEMOBEQ	Demob Equipment	10.00	EA	U								300.00			300	3,000
					UCC to Activity:	U								3,000.00			3,000	3,000
	1.0	UDISMUTL	Dismantle Utilities	1.00	LS	U								6,000.00			6,000	6,000
					UCC to Activity:	U								6,000.00			6,000	6,000
	1.0	UDISPOSL	Disposal of Debris	1.00	LS	U								3,000.00			3,000	3,000
					UCC to Activity:	U								3,000.00			3,000	3,000
			Resource List		UCC to Activity:	U								15,000			15,000	15,000
CREW Cost Detail																		
	10.0 Days		0.1000 LS/Da	10.0000 Da/LS			536.00 Cost/Da											
	10.0 Shifts		0.1000 LS/Sh	10.0000 Sh/LS			536.00 Cost/Sh											
	80.0 Hours		0.0125 LS/Hr	80.0000 Hr/LS			67.00 Cost/Hr											
	2.0	LWSLOP	Equipment Operator	160.00	HR	U	18.86										19	3,018
					UCC to Activity:	U	3,017.60										3,018	3,018
	2.0	LWSLAB	Site Laborer	160.00	HR	U	14.64										15	2,342
					UCC to Activity:	U	2,342.40										2,342	2,342
					Resource List Hour Rate:	U	67.00										67	
			Resource List		UCC to Activity:	U	5,360.00										5,360	5,360
190			Indirect Construct Cost	1.00	LS									2588094			2588094	2588094
Detaile																		
190	1		Permit & Legal (5%)	1.00	LS									143,783			143,783	143,783
Detaile																		
LIST Cost Detail																		
	1.0	UPERMLGL	Permit & Legal 5%	1.00	LS	U								143,783			143,783	143,783
					UCC to Activity:	U								143,783			143,783	143,783
			Resource List		UCC to Activity:	U								143,783			143,783	143,783
190	2		Health & Safety (10%)	1.00	LS									287,566			287,566	287,566
Detaile																		
LIST Cost Detail																		
	1.0	UH&S	Health & Safety 10%	1.00	LS	U								287,566			287,566	287,566
					UCC to Activity:	U								287,566			287,566	287,566
			Resource List		UCC to Activity:	U								287,566			287,566	287,566
190	3		Construct Management(10%)	1.00	LS									287,566			287,566	287,566
Detaile																		
LIST Cost Detail																		
	1.0	UCONSTMG	Construct Management 10%	1.00	LS	U								287,566			287,566	287,566
					UCC to Activity:	U								287,566			287,566	287,566
			Resource List		UCC to Activity:	U								287,566			287,566	287,566
190	4		QA & Oversight (10%)	1.00	LS									287,566			287,566	287,566
Detaile																		
LIST Cost Detail																		
	1.0	UQAOVEST	QA & Oversight 10%	1.00	LS	U								287,566			287,566	287,566
					UCC to Activity:	U								287,566			287,566	287,566
			Resource List		UCC to Activity:	U								287,566			287,566	287,566
190	5		Bid & Scope Conting.(10%)	1.00	LS									287,566			287,566	287,566
Detaile																		
LIST Cost Detail																		
	1.0	UBIDSCPE	Bid & Scope Conting. 10%	1.00	LS	U								287,566			287,566	287,566
					UCC to Activity:	U								287,566			287,566	287,566
			Resource List		UCC to Activity:	U								287,566			287,566	287,566

Code		Description	Quantity	UM	U T	Labor Base	Labor Burden	Equipmnt Ownershp	Equipmnt Operatn	Rentals	Material	Supply	Subcon	INTERNAL	Tax	Unit	Extended
190	6	Cert.Consruct.Report (5%)	1.00	LS									143,783			143,783	143,783
Detaile																	
LIST Cost Detail																	
1.0	UCERTREP	Cert. Constrct. Report 5%	1.00	LS	U								143,783			143,783	143,783
		UCC to Activity:			U								143,783			143,783	143,783
		Resource List UCC to Activity:			U								143,783			143,783	143,783
190	7	Surveying/GPS (10%)	1.00	LS									287,566			287,566	287,566
Detaile																	
LIST Cost Detail																	
1.0	USURVEYG	Survey/GPS 10%	1.00	LS	U								287,566			287,566	287,566
		UCC to Activity:			U								287,566			287,566	287,566
		Resource List UCC to Activity:			U								287,566			287,566	287,566
190	8	Office Proj. Mgmt (10%)	1.00	LS									287,566			287,566	287,566
Detaile																	
LIST Cost Detail																	
1.0	UPROJMGM	Office Project Manage 10%	1.00	LS	U								287,566			287,566	287,566
		UCC to Activity:			U								287,566			287,566	287,566
		Resource List UCC to Activity:			U								287,566			287,566	287,566
190	9	Miscellaneous (ODCs) (5%)	1.00	LS									143,783			143,783	143,783
Detaile																	
LIST Cost Detail																	
1.0	UMISC	Miscellaneous ODC's 5%	1.00	LS	U								143,783			143,783	143,783
		UCC to Activity:			U								143,783			143,783	143,783
		Resource List UCC to Activity:			U								143,783			143,783	143,783
190	10	Health Physics Support-5%	1.00	LS									143,783			143,783	143,783
Detaile																	
LIST Cost Detail																	
1.0	UHEALPHY	Health Physics Sup. 5%	1.00	LS	U								143,783			143,783	143,783
		UCC to Activity:			U								143,783			143,783	143,783
		Resource List UCC to Activity:			U								143,783			143,783	143,783
190	11	Gen.Contingency (10%)	1.00	LS									287,566			287,566	287,566
Detaile																	
LIST Cost Detail																	
1.0	UGENCONT	General Contingency 10%	1.00	LS	U								287,566			287,566	287,566
		UCC to Activity:			U								287,566			287,566	287,566
		Resource List UCC to Activity:			U								287,566			287,566	287,566
200		Post Closure Activity(PM)	1.00	LS									1266458			1266458	1266458
Detaile																	
200	1	Maintain Cover DA	1.00	LS									390,582			390,582	390,582
Detaile																	
LIST Cost Detail																	
1.0	UO&MCAP	O & M of Cap	2.41	LS	U								162,000			162,000	390,582
		UCC to Activity:			U								390,582			390,582	390,582
		Resource List UCC to Activity:			U								390,582			390,582	390,582
200	2	Quarterly Monitoring Well	4.00	EA									805,776			201,444	805,776
Detaile																	
LIST Cost Detail																	
1.0	UGWMONOM	GW Monitoring sampling	1.62	LS	U								497,700			497,700	805,776
		UCC to Activity:			U								201,444			201,444	805,776
		Resource List UCC to Activity:			U								201,444			201,444	805,776
200	3	CERCLA Reviews	1.00	LS									70,100			70,100	70,100
Detaile																	
LIST Cost Detail																	
1.0	USUMREPT	Summary Report PresentWth	1.00	LS	U								70,100			70,100	70,100
		UCC to Activity:			U								70,100			70,100	70,100
		Resource List UCC to Activity:			U								70,100			70,100	70,100

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ALTERNATIVE 2B:

POST CLOSURE ACTIVITIES COST DETAILS

Colonie, NY FUSRAP Site

Alternative 2B:
Large-Scale Excavation and Disposal (Radiological, Organics, and Metals)

Cost Estimate for Post-Closure Activities
Annual Costs

Activity	Item	Unit	Unit Price	Quantity	Cost	Total
Groundwater Monitoring	Technical Labor	QT	$4,000	4	$16,000	
	Car	QT	$100	4	$400	
	Analytical/ODCs	QT	$5,000	4	$20,000	
	Management/Admin (20%)	LS	$7,280	1	$7,280	
	Contingency (20%)	LS	$8,740	1	$8,740	
	Annual Cost					**$52,420**
Five-Year CERCLA Review	Report Labor	HR	$75	200	$15,000	
	Report Production	LS	$2,500	1	$2,500	
	Management/Admin (20%)	LS	$3,500	1	$3,500	
	Contingency (20%)	LS	$4,200	1	$4,200	
	Cost of one CERCLA Review					**$25,200**

Colonie, NY FUSRAP Site

Alternative 2B:
Large-Scale Excavation and Disposal (Radiological, Organics, and Metals)

Cost Estimate for Post-Closure Activities
Present Worth Costs

Activity	Annual Cost	Discount Rate	Number of Years	Present Worth Cost
Groundwater Monitoring	$52,420	5%	30	$805,800
Five-Year CERCLA Review	$25,200	5%	30	
Year 5				$19,744
Year 10				$15,470
Year 15				$12,121
Year 20				$9,498
Year 25				$7,442
Year 30				$5,831
Total				$70,106
Total Present Worth Cost (rounded)				**$875,900**

ALTERNATIVE 3B:

POST CLOSURE ACTIVITIES COST DETAILS

Colonie, NY FUSRAP Site

Alternative 3B:
Moderate Excavation and Cap and Cover

Cost Estimate for Post-Closure Activities
Annual Costs

Activity	Item	Unit	Unit Price	Quantity	Cost	Total
O&M of Cap	Inspector	MO	$450	12	$5,400	
	Laborer	MO	$300	12	$3,600	
	Operator	MO	$300	12	$3,600	
	Backhoe	MO	$120	12	$1,440	
	Car	MO	$100	12	$1,200	
	ODCs	MO	$200	12	$2,400	
	Management/Admin (20%)	LS	$3,530	1	$3,530	
	Contingency (20%)	LS	$4,230	1	$4,230	
	Annual Cost					**$25,400**
Groundwater Monitoring	Technical Labor	QT	$4,000	4	$16,000	
	Car	QT	$100	4	$400	
	Analytical/ODCs	QT	$5,000	4	$20,000	
	Management/Admin (20%)	LS	$7,280	1	$7,280	
	Contingency (20%)	LS	$8,740	1	$8,740	
	Annual Cost					**$52,420**
Five-Year CERCLA Review	Report Labor	HR	$75	200	$15,000	
	Report Production	LS	$2,500	1	$2,500	
	Management/Admin (20%)	LS	$3,500	1	$3,500	
	Contingency (20%)	LS	$4,200	1	$4,200	
	Cost of one CERCLA Review					**$25,200**

Colonie, NY FUSRAP Site

Alternative 3B:
Moderate Excavation and Cap and Cover

Cost Estimate for Post-Closure Activities
Present Worth Costs

Activity	Annual Cost	Discount Rate	Number of Years	Present Worth Cost
O&M of Cap	$25,400	5%	30	$390,449
Groundwater Monitoring	$52,420	5%	30	$805,800
Five-Year CERCLA Review	$25,200	5%	30	
Year 5				$19,744
Year 10				$15,470
Year 15				$12,121
Year 20				$9,498
Year 25				$7,442
Year 30				$5,831
Total				$70,106
Total Present Worth Cost (rounded)				**$1,266,400**