RECORD OF TECHNICAL CHANGE

Technical Change No. CR-1

Page 1

Project/Job No. DP05 090

Date AUG 24 2005

Project/Job Name Industrial Sites CAU 357

The following technical changes (including justification) are requested by:

Laura Pastor

(Name)

Project Task Manager

(Title)

Description of Change:

Appendix G Use Restrictions for CAU 357: Remove and destroy pages G-4, G-5 and G-6 and replace with revised pages G-4, G-5 and G-6 (attached).

Justification:

Pages G-4. Location of the use restriction signs revised in Figure G. 1-2.

Pages G-5 and G-6. The south and east monuments were adjusted during emplacement; therefore, the coordinates have been revised in the use restriction documentation.

The project time will be (Increased) (Decreased) (Unchanged) by approximately 0 days.

Applicable Project-Specific Document(s):

Closure Report for Corrective Action Unit 357; Mud Pits and Waste Dump, Nevada Test Site, Nevada, Revision 0, April 2005, DOE/NV-1045.

Approved By:

Sabine Curtis
NNSA/NSO Project Manager

Date

8/4/05

James J. Pappalardo
NNSA/NSO Environmental Restoration Division Director

Date

8/5/05

NDEP

AUG. 12. 2005 1:31PM DOE/NV/FSD

NO. 153

P. 2

RECORD OF TECHNICAL CHANGE Technical Change No. CR-1Page 1 of 1Project/Job No. DP05 090Date AUG 24 2005Project/Job Name Industrial Sites CAU 357

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Laura Pastor

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Project Task Manager

(Title)

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Closure Report for Corrective Action Unit 357; Mud Pits and Waste Dump, Nevada Test Site, Nevada, Revision 0, April 2005, DOE/NV-1045.

Approved By:

Sabine Curtis
active NNSA/NSO Project ManagerDate 8/4/05Samuel J. Pappalardo
NNSA/NSO Environmental Restoration Division DirectorDate 8/5/05Don E. EgoDate 8/12/05

NDEP

Explanation

- CAS 04-26-03 Footprint
- High Density of Bricks Area
- Concrete Pad
- CAS Marker
- Restricted Use Boundary
- Posting

SCALE (meters)
0 10 20 30 40

Coordinates in UTM 11N
NAD 1927 datum

This is a replacement page

Figure G.1-2

CAU 357, Mud Pits and Waste Dump
CAS 04-26-03
Land Use
Restriction Boundary

CAU Use Restriction Information

This is a replacement page

CAU

Number/Description: CAU 357, Mud Pits and Waste Dump

Applicable CAS Numbers/Descriptions: CAS 25-15-01, Waste Dump

Contact (organization/project): NNSA/NSO Industrial Sites Project Manager

Surveyed Area (UTM, Zone 11, NAD 27, meters):

North Corner: N=4075238.00 E=567652.60

Northeast Corner: N=4075226.90 E=567674.20

East Corner: N=4075177.20 E=567699.90

South Corner: N=4075160.00 E=567666.50

West Corner: N=4075199.00 E=567628.40

Survey Date: June 2005

Survey Method (GPS, etc): GPS

Site Monitoring Requirements: Inspection of monuments and for land subsidence

Required Frequency (quarterly, annually?): Annually

If Monitoring Has Started, Indicate last Completion Date: Not Applicable

Use Restrictions

The future use of any land related to this Corrective Action Unit (CAU), as described by the above surveyed location, is restricted from any DOE or Air Force activity that may alter or modify the containment control as approved by the state and identified in the CAU Closure Report or other CAU documentation unless appropriate concurrence is obtained in advance.

Comments: See the Closure Report for additional information on the condition of the site(s) and any monitoring and/or inspection requirements.

Submitted By:

Sabine Curtis

Date:

7/27/05

cc with copy of survey map (paper and digital (dgn) formats):
CAU Files (2 copies)

This is a replacement page

Nevada
Environmental
Restoration
Project

DOE/NV--1045

Closure Report for Corrective Action Unit 357: Mud Pits and Waste Dump, Nevada Test Site, Nevada

Controlled Copy No.: ____
Revision No.: 0

April 2005

Approved for public release; further dissemination unlimited.

Environmental Restoration
Division

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National Nuclear Security Administration
Nevada Site Office

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**CLOSURE REPORT FOR
CORRECTIVE ACTION UNIT 357:
MUD PITS AND WASTE DUMP,
NEVADA TEST SITE, NEVADA**

U.S. Department of Energy
National Nuclear Security Administration
Nevada Site Office
Las Vegas, Nevada

Controlled Copy No.: ____

Revision No.: 0

April 2005

Approved for public release; further dissemination unlimited.

UNCONTROLLED When Printed

**CLOSURE REPORT FOR
CORRECTIVE ACTION UNIT 357: MUD PITS AND WASTE DUMP,
NEVADA TEST SITE, NEVADA**

Approved by: APPROVED SIGNATURE Date: 4/21/05

Janet Appenzeller-Wing, Project Manager
Industrial Sites Project

Approved by: APPROVED SIGNATURE Date: 4/21/05

Robert M. Bangerter, Jr., Acting Division Director
Environmental Restoration Division

Table of Contents

List of Figures.....	v
List of Tables.....	viii
List of Acronyms and Abbreviations	xv
Executive Summary	ES-1
1.0 Introduction	1
1.1 Purpose.....	1
1.1.1 CAS 07-09-02	3
1.1.2 CAS 07-09-03	3
1.1.3 CAS 07-09-04	3
1.1.4 CAS 07-09-05	4
1.1.5 CAS 08-09-01	4
1.1.6 CAS 08-09-02	4
1.1.7 CAS 08-09-03	4
1.1.8 CAS 10-09-02	5
1.1.9 CAS 10-09-04	5
1.1.10 CAS 10-09-05	5
1.1.11 CAS 10-09-06	6
1.1.12 CAS 01-99-01	6
1.1.13 CAS 04-26-03	6
1.1.14 CAS 25-15-01	6
1.2 Scope.....	7
1.3 Closure Report Contents.....	8
1.3.1 Supporting Documentation	10
1.3.2 Data Quality Objectives.....	10
2.0 Closure Activities	11
2.1 Description of Corrective Action Activities.....	12
2.1.1 CAS 07-09-02, Mud Pit.....	13
2.1.2 CAS 07-09-03, Mud Pit.....	14
2.1.3 CAS 07-09-04, Mud Pit.....	17
2.1.4 CAS 07-09-05, Mud Pit.....	21
2.1.5 CAS 08-09-01, Mud Pit.....	23
2.1.6 CAS 08-09-02, Mud Pit.....	26
2.1.7 CAS 08-09-03, Mud Pit.....	28
2.1.8 CAS 10-09-02, Mud Pit.....	28
2.1.9 CAS 10-09-04, Mud Pit.....	29
2.1.10 CAS 10-09-05, Mud Pit.....	33
2.1.11 CAS 10-09-06, Mud Pit; Stains; Material	33
2.1.12 CAS 01-99-01, Boxes; Pipes	35

Table of Contents *(Continued)*

2.1.13	CAS 04-26-03, Lead Bricks.	37
2.1.14	CAS 25-15-01, Waste Dump.	43
2.2	Deviations from SAFER Plan as Approved.	48
2.3	Corrective Action Schedule as Completed.	52
2.4	Site Plans/Survey Plat.	52
3.0	Waste Disposition.	53
3.1	Waste Minimization.	53
3.2	Characterization.	53
3.3	Waste Streams.	54
3.4	Waste Sampling.	55
3.5	Storage.	55
3.6	Waste Disposal.	55
4.0	Closure Verification Results.	57
4.1	Data Quality Assessment.	64
4.1.1	Review DQOs and Sampling Design.	66
4.1.1.1	Decision I.	67
4.1.1.1.1	DQO Provisions to Limit False Negative Decision Error.	67
4.1.1.1.2	DQO Provisions to Limit False Positive Decision Error.	78
4.1.1.2	Decision II.	78
4.1.1.2.1	DQO Provisions to Limit False Negative Decision Error.	78
4.1.1.2.2	DQO Provisions to Limit False Positive Decision Error.	84
4.1.2	Conduct a Preliminary Data Review.	84
4.1.3	Select the Test and Identify Key Assumptions.	85
4.1.4	Verify the Assumptions.	85
4.1.5	Results.	85
4.1.5.1	Decision I.	87
4.1.5.2	Decision II Decision Rules.	87
4.2	Use Restriction.	88
4.2.1	CAS 10-09-06.	88
4.2.2	CAS 04-26-03.	90
4.2.3	CAS 25-15-01.	91
5.0	Conclusions and Recommendations.	92
5.1	Justification for No Further Action.	92
5.2	Justification for Clean Closure.	92

Table of Contents *(Continued)*

5.3	Justification for Close in Place with Use Restriction	93
5.3.1	CAS 10-09-06	93
5.3.2	CAS 04-26-03	93
5.3.3	CAS 25-15-01	93
6.0	References	94

Appendix A - DQOs as Developed in the SAFER Plan for CAU 357

A.1.0	Data Quality Objectives	A-1
A.1.1	Step 1, State the Problem	A-1
A.1.1.1	DQO Planning Team Members	A-1
A.1.1.2	Describe the Problem	A-1
A.1.1.3	Develop Conceptual Site Models	A-2
A.1.1.3.1	CSM #1 for Mud Pits, Waste Dump, and Lead Bricks CASs	A-5
A.1.1.3.2	CSM #2 for Boxes; Pipes CAS	A-11
A.1.2	Step 2, Identify the Decisions	A-13
A.1.2.1	Develop a Problem and Decision Statement(s)	A-13
A.1.2.2	Alternative Actions to the Decision	A-15
A.1.3	Step 3, Identify the Inputs to the Decision	A-15
A.1.3.1	Information Needs and Sources	A-15
A.1.3.2	Determine the Basis for Preliminary Action Levels	A-21
A.1.3.3	Potential Sampling Techniques and Appropriate Analytical Methods	A-22
A.1.3.3.1	Geophysical Surveys	A-23
A.1.3.3.2	Geodetic Surveys	A-23
A.1.3.3.3	Field Screening	A-23
A.1.3.3.4	Soil Sampling	A-24
A.1.3.3.5	Analytical Program	A-24
A.1.4	Step 4, Define the Boundaries of the Study	A-26
A.1.4.1	Define the Target Population	A-26
A.1.4.2	Determine the Spatial and Temporal Boundaries	A-27
A.1.4.3	Identify Practical Constraints	A-28
A.1.4.4	Define the Scale of Decision Making	A-29
A.1.5	Step 5, Develop a Decision Rule	A-29
A.1.5.1	Specify the Population Parameter	A-29
A.1.5.2	Choose an Action Level	A-30
A.1.5.3	Decision Rule	A-30
A.1.6	Step 6, Specify Tolerable Limits on Decision Errors	A-30
A.1.6.1	False Rejection Decision Error	A-31

Table of Contents *(Continued)*

A.1.6.2	False Acceptance Decision Error.	A-33
A.1.6.3	Quality Assurance/Quality Control	A-33
A.1.7	Step 7, Optimize the Design for Obtaining Data	A-34
A.1.7.1	CSM #1: For Mud Pit CASs 07-09-02, 07-09-03, 07-09-04, 07-09-05, 08-09-01, 08-09-02, 08-09-03, 10-09-02, 10-09-04, 10-09-05, 10-09-06, Waste Dump CAS 25-15-01, and Lead Bricks CAS 04-26-03.	A-36
A.1.7.2	CSM #2 for CAS 01-99-01, Boxes; Pipes.	A-56
A.2.0	References.	A-59
 Appendix B - Closure Certification for CAU 357		
B.1.0	Closure Certification.	B-1
B.1.1	CAS 08-09-01 Closure Activities.	B-1
 Appendix C - As-Built Documentation for CAU 357		
C.1.0	As-Built Documentation.	C-1
 Appendix D - Sample Analytical Results for CAU 357		
D.1.0	References.	D-74
 Appendix E - Waste Disposition Documentation for CAU 357		
 Appendix F - Modifications to the Post-Closure Plan for CAU 357		
F.1.0	Modifications to the Post-Closure Plan	F-1
 Appendix G - Use Restrictions for CAU 357		
 Appendix H - Visual Sample Plan Calculation Results for CAU 357, CAS 07-09-03		
 Appendix I - Residual Radiation (RESRAD) Computer Code Calculation Results for CAU 357		
 Appendix J - Closure Recommendation for CAS 04-26-03		
 Appendix K - Nevada Division of Environmental Protection Document Review Sheets		

List of Figures

<i>Number</i>	<i>Title</i>	<i>Page</i>
1-1	Nevada Test Site	2
2-1	CAU 357, CAS 07-09-02, Mud Pit.	15
2-2	CAU 357, CAS 07-09-03, Mud Pit.	18
2-3	CAU 357, CAS 07-09-04, Mud Pit.	20
2-4	CAU 357, CAS 07-09-05, Mud Pit Site Map.	22
2-5	CAU 357, CAS 08-09-01, Mud Pit.	25
2-6	CAU 357, CAS 08-09-02, Mud Pit.	27
2-7	CAU 357, CAS 08-09-03, Mud Pit.	30
2-8	CAU 357, CAS 10-09-02, Mud Pit.	32
2-9	CAU 357, CAS 10-09-04, Mud Pit.	34
2-10	CAU 357, CAS 10-09-05, Mud Pit.	36
2-11	CAU 357, CAS 10-09-06, Mud Pit; Stains; Materials	38
2-12	CAU 357, CAS 01-99-01, Boxes; Pipes - “Building 1-31.2e1”.	40
2-13	CAU 357, CAS 04-26-03, Initial Geophysical Survey.	41
2-14	CAU 357, CAS 04-26-03, Final Geophysical Survey	42
2-15	CAU 357, CAS 04-26-03, Lead Debris and Sample Locations	49
2-16	CAU 357, CAS 25-15-01, Waste Dump.	51

List of Figures (Continued)

<i>Number</i>	<i>Title</i>	<i>Page</i>
4-1	CAU 357, CAS 10-09-06, Mud Pit; Stains; Materials.	62
4-2	CAU 357, CAS 04-26-03, Remaining Lead Concentrations.	65
A.1-1	CAU 357, CSM #1: For Mud Pits, Waste Dump, and Lead Bricks	A-6
A.1-2	Typical Mud Pit Cross Section Illustrating Idealized Sampling Locations	A-8
A.1-3	CAU 357 CSM #2: For Boxes; Pipes-Cut Away View of Building 1-31.2e1	A-12
A.1-4	CAU 357 Closure Decision Process	A-14
A.1-5	CAU 357, CAS 07-09-02, Mud Pit	A-39
A.1-6	CAU 357, CAS 07-09-03, Mud Pit	A-40
A.1-7	CAU 357, CAS 07-09-04, Mud Pit	A-41
A.1-8	CAU 357, CAS 07-09-05, Mud Pit	A-42
A.1-9	CAU 357, CAS 08-09-01, Mud Pit	A-43
A.1-10	CAU 357, CAS 08-09-02, Mud Pit	A-44
A.1-11	CAU 357, CAS 08-09-03, Mud Pit	A-45
A.1-12	CAU 357, CAS 10-09-02, Mud Pit	A-46
A.1-13	CAU 357, CAS 10-09-04, Mud Pit	A-47
A.1-14	CAU 357, CAS 10-09-05, Mud Pit	A-48
A.1-15	CAU 357, CAS 10-09-06, Mud Pit; Stains; Material	A-49

List of Figures (Continued)

<i>Number</i>	<i>Title</i>	<i>Page</i>
A.1-16	CAU 357, CAS 25-15-01, Waste Dump	A-52
A.1-17	CAU 357, CAS 04-26-03, Lead Bricks.....	A-55
A.1-18	CAU 357, CAS 01-99-01, Boxes; Pipes - “Building 1-31.2e1”	A-58
G.1-1	CAU 357, Mud Pits and Waste Dump, CAS 10-09-06 Land Use Restriction Boundary	G-2
G.1-2	CAU 357, Mud Pits and Waste Dump, CAS 04-26-03, Land Use Restriction Boundary	G-4
G.1-3	CAU 357, Mud Pits and Waste Dump, CAS 25-15-01, Land Use Restriction Boundary	G-6

List of Tables

<i>Number</i>	<i>Title</i>	<i>Page</i>
2-1	Samples Collected at CAS 07-09-02, Mud Pit	14
2-2	Samples Collected at CAS 07-09-03, Mud Pit	16
2-3	Samples Collected at CAS 07-09-04, Mud Pit	19
2-4	Samples Collected at CAS 07-09-05, Mud Pit	21
2-5	Samples Collected at CAS 08-09-01, Mud Pit	23
2-6	Samples Collected at CAS 08-09-02, Mud Pit	26
2-7	Samples Collected at CAS 08-09-03, Mud Pit	29
2-8	Samples Collected at CAS 10-09-02, Mud Pit	31
2-9	Samples Collected at CAS 10-09-04, Mud Pit	33
2-10	Samples Collected at CAS 10-09-05, Mud Pit	35
2-11	Samples Collected at CAS 10-09-06, Mud Pit; Stains; Materials	37
2-12	Samples Collected at CAS 01-99-01, Boxes; Pipes	39
2-13	Samples Collected at CAS 04-26-03, Lead Bricks	44
2-14	Samples Collected at CAS 25-15-01, Waste Dump	50
4-1	Decision I Sample Location Justification for CAU 357	69
4-2	CAU 357 Number of Samples Submitted per Analyte	71
4-3	Chemical Analytes Failing Sensitivity Criteria (mg/kg)	72

List of Tables (Continued)

<i>Number</i>	<i>Title</i>	<i>Page</i>
4-4	Radiological Analytes Failing Sensitivity Criteria	73
4-5	Chemical Precision Measurements for CAU 357	74
4-6	Radiological Precision Measurements for CAU 357	75
4-7	Chemical Accuracy Measurements for CAU 357	76
4-8	Radiological Accuracy Measurements for CAU 357	77
4-9	CAU 357 Rejected Data for CAS 08-09-01, Mud Pit	79
4-10	CAU 357 Rejected Data for CAS 10-09-06, Mud Pit; Stains; Materials	80
4-11	CAU 357 Rejected Data for CAS 04-26-03, Lead Bricks	81
4-12	Chemical Completeness Measurements for CAU 357	82
4-13	Radiological Completeness Measurements for CAU 357	82
4-14	Key Assumptions	86
A.1-1	Identified Information/Data Needs to Resolve Decision	A-17
A.1-2	Contaminants of Potential Concern for CAU 357 CASs	A-25
D.1-1	Soil Sample Results for Metals Detected Above Minimum Reporting Limits at CAS 07-09-02, Mud Pit	D-2
D.1-2	Soil Sample Results for Gamma-Emitting Radionuclides Detected Above Minimum Detectable Concentrations at CAS 07-09-02, Mud Pit	D-3
D.1-3	Soil Samples Results for Isotopes Detected Above Minimum Detectable Concentrations at CAS 07-09-02, Mud Pit	D-4

List of Tables (Continued)

<i>Number</i>	<i>Title</i>	<i>Page</i>
D.1-4	Soil Sample Results for Total VOCs Detected Above Minimum Reporting Limits at CAS 07-09-03, Mud Pit.	D-6
D.1-5	Soil Sample Results for TPH-DRO Detected Above Minimum Reporting Limits at CAS 07-09-03, Mud Pit.	D-7
D.1-6	Soil Sample Results for Metals Detected Above Minimum Reporting Limits at CAS 07-09-03, Mud Pit.	D-8
D.1-7	Soil Sample Results for Gamma-Emitting Radionuclides Detected Above Minimum Detectable Concentrations at CAS 07-09-03, Mud Pit	D-11
D.1-8	Soil Sample Results for Isotopes Detected Above Minimum Detectable Concentrations at CAS 07-09-03, Mud Pit.	D-14
D.1-9	Soil Sample Results for Metals Detected Above Minimum Reporting Limits at CAS 07-09-04, Mud Pit.	D-17
D.1-10	Soil Sample Results for Gamma-Emitting Radionuclides Detected Above Minimum Detectable Concentrations at CAS 07-09-04, Mud Pit	D-18
D.1-11	Soil Sample Results for Isotopes Detected Above Minimum Detectable Concentrations at CAS 07-09-04, Mud Pit.	D-19
D.1-12	Soil Sample Results for Total VOCs Detected Above Minimum Reporting Limits at CAS 07-09-05, Mud Pit	D-21
D.1-13	Soil Sample Results for Metals Detected Above Minimum Reporting Limits at CAS 07-09-05, Mud Pit.	D-22
D.1-14	Soil Sample Results for Gamma-Emitting Radionuclides Detected Above Minimum Detectable Concentrations at CAS 07-09-05, Mud Pit	D-23

List of Tables (Continued)

<i>Number</i>	<i>Title</i>	<i>Page</i>
D.1-15	Soil Sample Results for Isotopes Detected Above Minimum Detectable Concentrations at CAS 07-09-05, Mud Pit.	D-24
D.1-16	Soil Sample Results for Total VOCs Detected Above Minimum Reporting Limits at CAS 08-09-01, Mud Pit.	D-26
D.1-17	Soil Sample Results for TPH-DRO Detected Above Minimum Reporting Limits at CAS 08-09-01, Mud Pit.	D-26
D.1-18	Soil Sample Results for Metals Detected Above Minimum Reporting Limits at CAS 08-09-01, Mud Pit	D-27
D.1-19	Soil Sample Results for Gamma-Emitting Radionuclides Detected Above Minimum Detectable Concentrations at CAS 08-09-01, Mud Pit	D-28
D.1-20	Soil Sample Results for Isotopes Detected Above Minimum Detectable Concentrations at CAS 08-09-01, Mud Pit.	D-29
D.1-21	Soil Sample Results for Metals Detected Above Minimum Reporting Limits at CAS 08-09-02, Mud Pit.	D-31
D.1-22	Soil Sample Results for Gamma-Emitting Radionuclides Detected Above Minimum Detectable Concentrations at CAS 08-09-02, Mud Pit	D-32
D.1-23	Soil Sample Results for Isotopes Detected Above Minimum Detectable Concentrations at CAS 08-09-02, Mud Pits	D-33
D.1-24	Soil Sample Results for Metals Detected Above Minimum Reporting Limits at CAS 08-09-03, Mud Pit.	D-35
D.1-25	Soil Sample Results for Gamma-Emitting Radionuclides Detected Above Minimum Detectable Concentrations at CAS 08-09-03, Mud Pit	D-36

List of Tables (Continued)

<i>Number</i>	<i>Title</i>	<i>Page</i>
D.1-26	Soil Sample Results for Isotopes Detected Above Minimum Detectable Concentrations at CAS 08-09-03, Mud Pit.	D-37
D.1-27	Soil Sample Results for TPH-DRO Detected Above Minimum Reporting Limits at CAS 10-09-02, Mud Pit.	D-39
D.1-28	Soil Sample Results for PCBs Detected Above Minimum Reporting Limits at CAS 10-09-02, Mud Pit.	D-39
D.1-29	Soil Sample Results for Total SVOCs Detected Above Minimum Reporting Limits at CAS 10-09-02, Mud Pit.	D-39
D.1-30	Soil Sample Results for Metals Detected Above Minimum Reporting Limits at CAS 10-09-02, Mud Pit.	D-40
D.1-31	Soil Sample Results for Gamma-Emitting Radionuclides Detected Above Minimum Detectable Concentrations at CAS 10-09-02, Mud Pit	D-42
D.1-32	Soil Sample Results for Isotopes Detected Above Minimum Detectable Concentrations at CAS 10-09-02, Mud Pit.	D-44
D.1-33	Soil Sample Results for Total VOCs Detected Above Minimum Reporting Limits at CAS 10-09-04, Mud Pit.	D-46
D.1-34	Soil Sample Results for Metals Detected Above Minimum Reporting Limits at CAS 10-09-04, Mud Pit.	D-47
D.1-35	Soil Sample Results for Gamma-Emitting Radionuclides Detected Above Minimum Detectable Concentrations at CAS 10-09-04, Mud Pit	D-48
D.1-36	Soil Sample Results for Isotopes Detected Above Minimum Detectable Concentrations at CAS 10-09-04, Mud Pit.	D-49

List of Tables (Continued)

<i>Number</i>	<i>Title</i>	<i>Page</i>
D.1-37	Soil Sample Results for Total VOCs Detected Above Minimum Reporting Limits at CAS 10-09-05, Mud Pit	D-51
D.1-38	Soil Sample Results for Metals Detected Above Minimum Reporting Limits at CAS 10-09-05, Mud Pit.	D-52
D.1-39	Soil Sample Results for Gamma-Emitting Radionuclides Detected Above Minimum Detectable Concentrations at CAS 10-09-05, Mud Pit	D-53
D.1-40	Soil Sample Results for Isotopes Detected Above Minimum Detectable Concentrations at CAS 10-09-05, Mud Pit.	D-54
D.1-41	Soil Sample Results for Total VOCs Detected Above Minimum Reporting Limits at CAS 10-09-06, Mud Pit.	D-56
D.1-42	Soil Sample Results for TPH-DRO Detected Above Minimum Reporting Limits for CAS 10-09-06, Mud Pit.	D-56
D.1-43	Soil Sample Results for PCBs Detected Above Minimum Reporting Limits at CAS 10-09-06, Mud Pit.	D-56
D.1-44	Soil Sample Results for Metals Detected Above Minimum Reporting Limits at CAS 10-09-06, Mud Pit; Stains; Material	D-57
D.1-45	Soil Sample Results for Gamma-Emitting Radionuclides Detected Above Minimum Detectable Concentrations at CAS 10-09-06, Mud Pit	D-58
D.1-46	Soil Sample Results for Isotopes Detected Above Minimum Detectable Concentrations at CAS 10-09-06, Mud Pit.	D-59
D.1-47	Soil Sample Results for Gamma-Emitting Radionuclides Detected Above Minimum Detectable Concentrations at CAS 01-99-01, Boxes; Pipes	D-61

List of Tables (Continued)

<i>Number</i>	<i>Title</i>	<i>Page</i>
D.1-48	Soil Sample Results for Isotopes Detected Above Minimum Detectable Concentrations at CAS 01-99-01, Boxes; Pipes	D-62
D.1-49	Sample Results for Metals Detected Above Minimum Reporting Limits at CAS 04-26-03, Lead Bricks	D-64
D.1-50	Soil Sample Results for Metals Detected Above Minimum Reporting Limits at CAS 25-15-01, Waste Dump.	D-70
D.1-51	Soil Sample Results for Gamma-Emitting Radionuclides Detected Above Minimum Detectable Concentrations at CAS 25-15-01, Waste Dump	D-71
D.1-52	Soil Sample Results for Isotopes Detected Above Minimum Detectable Concentrations at CAS 25-15-01, Waste Dump.	D-73
E.1-1	Waste Management Sample Result Detected Above Minimum Reporting Limits at CAS 08-09-01, Mud Pit.	E-5
E.1-2	Waste Management Soil Sample Results Detected Above Minimum Reporting Limits at CAS 08-03-03, Mud Pit	E-6
E.1-3	Waste Management Sample Results Detected Above Minimum Reporting Limits at CAS 10-09-02, Mud Pit	E-7
E.1-4	Waste Management Sample Results Detected Above Minimum Reporting Limits at CAS 04-26-03.	E-9

List of Acronyms and Abbreviations

ALARA	As low as reasonably achievable
bgs	Below ground surface
C	Carbon
CAS	Corrective Action Site
CAU	Corrective Action Unit
CEDE	Committed effective dose equivalent
CFR	<i>Code of Federal Regulations</i>
cm	Centimeter
Co	Cobalt
COC	Contaminant of concern
COPC	Contaminant of potential concern
cps	Counts per second
CR	Closure Report
Cs	Cesium
CSM	Conceptual site model
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DQA	Data quality assessment
DQI	Data quality indicators
DQO	Data quality objective
DRO	Diesel-range organics
EDE	Effective dose equivalent
EPA	U.S. Environmental Protection Agency
FAL	Final action level
FD	Field duplicate
FFACO	<i>Federal Facility Agreement and Consent Order</i>

List of Acronyms and Abbreviations (Continued)

FID	Flame-ionization detector
FSL	Field-screening level
ft	Foot
GC	Gas chromatograph
GPS	Global positioning system
GRO	Gasoline-range organics
HWAA	Hazardous waste accumulation area
IDW	Investigation-derived waste
in.	Inch(es)
LCS	Laboratory control sample
LCSD	Laboratory control sample duplicate
LLNL	Lawrence Livermore National Laboratory
LLW	Low-level radioactive waste
MDL	Method detection limit
mg/kg	Milligram per kilogram
mi	Mile
mrem/yr	Millirems per year
MS/MSD	Matrix spike/matrix spike duplicate
MX	Missile experiment
NAC	<i>Nevada Administrative Code</i>
NCRP	National Council on Radiation Protection and Measurements
NDEP	Nevada Division of Environmental Protection
ND	Normalized difference
NNSA/NSO	U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office
NTS	Nevada Test Site
NTSWAC	Nevada Test Site Waste Acceptance Criteria

List of Acronyms and Abbreviations (Continued)

PAL	Preliminary action level
PCB	Polychlorinated biphenyls
pCi/g	Picocurie per gram
PID	Photoionization detector
PPE	Personal protective equipment
PRG	Preliminary Remediation Goals
Pu	Plutonium
QA	Quality assurance
QAPP	Quality Assurance Project Plan
QC	Quality control
Ra	Radium
RCRA	<i>Resource Conservation and Recovery Act</i>
RESRAD	Residual radiation
RMA	Radioactive Materials Area
R-MAD	Reactor Maintenance, Assembly, and Disassembly
RMSF	Radioactive Management Facility
ROTC	Record of Technical Change
RPD	Relative percent difference
RWP	Radiological Work Permit
SAA	Satellite Accumulation Area
SAFER	Streamlined Approach for Environmental Restoration
SVOC	Semivolatile organic compound
TEDE	Total effective dose equivalent
Th	Thorium
TPH	Total petroleum hydrocarbons
TSCA	<i>Toxic Substance Control Act</i>

List of Acronyms and Abbreviations (Continued)

TSDF	Treatment, Storage, and Disposal Facility
VOC	Volatile organic compound
VSP	Visual Sampling Plan
U	Uranium
UCL	Upper confidence level
WM	Waste Management
µg/kg	Micrograms per kilogram

Executive Summary

This Closure Report presents information supporting the closure of Corrective Action Unit (CAU) 357: Mud Pits and Waste Dump, Nevada Test Site, Nevada. This Closure Report complies with the requirements of the *Federal Facility Agreement and Consent Order* (FFACO, 1996) that was agreed to by the State of Nevada, the U.S. Department of Energy, and the U.S. Department of Defense. The corrective action sites (CASs) within CAU 357 are located within Areas 1, 4, 7, 8, 10, and 25 of the Nevada Test Site. Corrective Action Unit 357 is comprised of the following CASs:

- CAS 07-09-02, Mud Pit
- CAS 07-09-03, Mud Pit
- CAS 07-09-04, Mud Pit
- CAS 07-09-05, Mud Pit
- CAS 08-09-01, Mud Pit
- CAS 08-09-02, Mud Pit
- CAS 08-09-03, Mud Pit
- CAS 10-09-02, Mud Pit
- CAS 10-09-04, Mud Pit
- CAS 10-09-05, Mud Pit
- CAS 10-09-06, Mud Pit; Stains; Material
- CAS 01-99-01, Boxes; Pipes
- CAS 04-26-03, Lead Bricks
- CAS 25-15-01, Waste Dump

The purpose of this Closure Report is to provide documentation supporting the closure alternatives of no further action, clean closure, or close in place with administrative controls for the CASs within CAU 357. The following activities were performed during the investigation:

- Conducted geophysical and radiological surveys to assist in the selection of sample locations and identification of lead bricks/debris.
- Collected environmental samples to be submitted for chemical and radiological analysis.

- Evaluated analytical data, determined extent of contamination, and reviewed remedial alternatives to determine a remedial action at applicable CAS.
- Performed closure activities to address the presence of substances regulated by the *Nevada Administrative Code* 445A.2272 (NAC, 2003).

From August 16, 2004, through January 5, 2005, closure activities were performed as set forth in the *Streamlined Approach for Environmental Restoration Plan for CAU 357, Mud Pits and Waste Dumps, Nevada Test Site, Nevada* (NNSA/NSO, 2003b). The purposes of the corrective action activities as defined during the data quality objectives process were:

- Determine whether contaminants of potential concern (COPCs) are present.
- If contaminants of concern (COCs) are present, determine their extent.
- Provide sufficient information and data supporting the preferred closure alternative.

Analytes detected during the closure activities were evaluated against final action levels (FALs) to determine the COCs at CAU 357. The evaluation of the analytical data generated from corrective action activities determined that the following COCs were present in soil samples collected from the CASs provided below:

- CAS 08-09-01, Mud Pit - Total petroleum hydrocarbons-diesel-range organics
- CAS 08-09-03, Mud Pit - Cesium-137
- CAS 10-09-02, Mud Pit - Cesium-137 and plutonium-239
- CAS 10-09-06, Mud Pit; Stains; Material - Cobalt-60
- CAS 04-26-03, Lead Bricks - Lead

Excavation activities were conducted at CASs 08-09-01 and 04-26-03 to remove soil impacted by COCs. These CAS were remediated and verification soil samples were collected. The analytical results obtained from verification samples indicated that no COCs were detected at concentrations that exceeded their respective FALs. The FAL was calculated for lead at CAS 04-26-03 due to the detection of lead concentrations in surface soils within the lead brick/debris “high-density area” that exceeded the preliminary action level.

The analytical results obtained from soil samples collected at CAS 08-09-03, 10-09-02, and 10-09-06 indicated concentrations of radionuclides exceeding the preliminary action levels. Site-specific inputs were entered in the Residual Radiation computer code (version 6.22) to calculate the FALs for the site-specific radionuclides. The analytical results obtained from soil samples collected at

CASs 08-09-03 and 10-09-02 indicated that concentrations of radionuclides did not exceed the site-specific FALs. The analytical results obtained from soil samples collected at CAS 10-09-06 indicated a concentration of cobalt-60 in a surface soil sample above the FAL.

The U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office provides the following recommendations:

- No Further Action at CASs 07-09-02, 07-09-03, 07-09-04, 07-09-05, 08-09-02, 08-09-03, 10-09-02, 10-09-04, 10-09-05, and 01-99-01.
- Clean Closure at CAS 08-09-01.
- Close in Place with administrative controls at CASs 10-09-06, 04-26-03, and 25-15-01.
- A Notice of Completion is requested from the Nevada Division of Environmental Protection for the closure of CAU 357.
- Corrective Action Unit 357 should be moved from Appendix III to Appendix IV of the *Federal Facility Agreement and Consent Order*.

1.0 Introduction

This Closure Report (CR) presents information supporting closure of Corrective Action Unit (CAU) 357: Mud Pits and Waste Dump, Nevada Test Site (NTS), Nevada. The CR complies with the requirements of the *Federal Facility Agreement and Consent Order* (FFACO) that was agreed to by the State of Nevada, U.S. Department of Energy (DOE), and the U.S. Department of Defense (FFACO, 1996). Corrective Action Unit 357 is comprised of 14 Corrective Action Sites (CASs) located in Areas 1, 4, 7, 8, 10, and 25 of the NTS ([Figure 1-1](#)). The NTS is located approximately 65 miles (mi) northwest of Las Vegas, Nevada.

Corrective Action Unit 357 consists of 11 CASs that are mud pits located in Areas 7, 8, and 10. The mud pits were associated with drilling activities conducted on the NTS in support of the underground nuclear weapons testing. The remaining three CASs are boxes and pipes associated with Building 1-31.2el, lead bricks, and a waste dump. These CAS are located in Areas 1, 4, and 25, respectively. The following CASs are shown on [Figure 1-1](#):

- CAS 07-09-02, Mud Pit
- CAS 07-09-03, Mud Pit
- CAS 07-09-04, Mud Pit
- CAS 07-09-05, Mud Pit
- CAS 08-09-01, Mud Pit
- CAS 08-09-02, Mud Pit
- CAS 08-09-03, Mud Pit
- CAS 10-09-02, Mud Pit
- CAS 10-09-04, Mud Pit
- CAS 10-09-05, Mud Pit
- CAS 10-09-06, Mud Pit; Stains; Material
- CAS 01-99-01, Boxes; Pipes
- CAS 04-26-03, Lead Bricks
- CAS 25-15-01, Waste Dump

1.1 Purpose

The purpose of the corrective action activities was to obtain analytical data that supports the closure of CAU 357. Environmental samples were collected during the investigation to determine whether contaminants exist and if detected, their extent. The investigation and sampling strategy was designed to target locations and media most likely to be contaminated (biased sampling). A general

Figure 1-1
Nevada Test Site

site conceptual model was developed for each CAS to support and guide the investigation as outlined in the Streamlined Approach for Environmental Restoration (SAFER) Plan (NNSA/NSO, 2003b).

This CR summarizes the results of corrective action activities, provides the data confirming the selection of corrective actions, and provides documentation of the completed closure activities conducted in accordance with the SAFER Plan (NNSA/NSO, 2003b). A brief description of the CAU and associated CASs is provided in the following section. A more detailed history of each CAS is provided in the SAFER Plan for CAU 357 (NNSA/NSO, 2003b).

1.1.1 CAS 07-09-02

Corrective Action Site 07-09-02 is a mud pit located approximately 50 feet (ft) west of borehole UE-7L in Area 7. The mud pit is believed to have supported the drilling of borehole UE-7L. This borehole was an exploratory hole that supported the Rudder Test sponsored by Lawrence Livermore National Laboratory (LLNL) that occurred on December 28, 1976 (DOE/NV, 2000b). The drilling muds and associated constituents are the primary source of potential contamination and the focus of this investigation.

1.1.2 CAS 07-09-03

Corrective Action Site 07-09-03 is a mud pit located in Area 7. The CAS is described by FFAO (1996) as a mud pit; however, a subsequent site reconnaissance determined that the CAS is most likely a mud disposal and/or haul-truck washout “pit” area. The CAS consists of two areas (Mud Pit A and Mud Pit B) defined by natural berms, dirt roads, and natural slopes. The drilling muds and associated constituents are the primary source of potential contamination and the focus of this investigation.

1.1.3 CAS 07-09-04

Corrective Action Site 07-09-04 is a mud pit located in Area 7. The mud pit is located approximately 2 mi north of the Area 3 Mud Plant. This CAS appears to be a mud staging area rather than a traditional mud pit. Two parallel metal pipes extend through the southern berm into the mud pit. The easternmost metal pipe leads from the mud pit to the Area 3 Mud Plant. The drilling muds and

associated constituents are the primary source of potential contamination and the focus of this investigation.

1.1.4 CAS 07-09-05

Corrective Action Site 07-09-05 is a mud pit located in Area 7. This mud pit is suspected to have supported activities associated with the Bourbon Test, sponsored by LLNL conducted on January 20, 1967. Historical records indicate that this mud pit may have also supported two other drilling operations: an emplacement hole U-7n completed on February 24, 1966; and an exploratory hole UE-7n that was suspended on April 14, 1976. The drilling muds and associated constituents are the primary source of potential contamination and the focus of this investigation.

1.1.5 CAS 08-09-01

Corrective Action Site 08-09-01 is a mud pit located in Area 8. The mud pit is associated with exploratory drill hole UE-8h completed on April 23, 1971. Drill hole UE-8h supported activities associated with the Cyathus Test sponsored by LLNL and conducted on March 6, 1970. The drilling muds and associated constituents are the primary source of potential contamination and the focus of this investigation.

1.1.6 CAS 08-09-02

Corrective Action Site 08-09-02 is a mud pit located approximately 96 ft southwest of the U-8d crater in Area 8. The U-8d crater is currently posted as a contamination area. The mud pit is suspected to have supported post-test activities associated with drill hole U-8d PS #2A and the Baneberry Test sponsored by LLNL and performed on December 18, 1970. The Baneberry Test vented and released radioactive fallout. The drilling muds and associated constituents are the primary source of potential contamination and the focus of this investigation.

1.1.7 CAS 08-09-03

Corrective Action Site 08-09-03 is a two mud-pit system (Mud Pit A and Mud Pit B) located approximately 80 ft southwest of the U-8d crater in Area 8. The U-8d crater is currently posted as a contamination area. The mud pit is suspected to have supported post-test activities associated with

drill hole U-8d PS #3A and the Baneberry Test sponsored by LLNL and performed on December 18, 1970. The Baneberry Test vented and released radioactive fallout. The drilling muds and associated constituents are the primary source of potential contamination and the focus of this investigation.

1.1.8 CAS 10-09-02

Corrective Action Site 10-09-02 is a two mud-pit system (Mud Pit A and Mud Pit B) located approximately 100 ft west of the U-10as crater in Area 10. These mud pits are believed to have supported the emplacement drill hole U-10as, completed on July 24, 1971, and associated with the Pinedrops-Bayou, Pinedrops-Sloat, and Pinedrops-Tawny test that occurred on January 10, 1974. A metal pipe connects the two mud pits. The drilling muds and associated constituents are the primary source of potential contamination and the focus of this investigation.

1.1.9 CAS 10-09-04

Corrective Action Site 10-09-04 is a mud pit located approximately 60 ft east of the emplacement borehole U-10aj-G in Area 10. The mud pit supported the drilling of this borehole and is assumed to contain the pretest cuttings/drilling mud from this borehole. The drilling mud and associated constituents are the primary source of potential contamination and the focus of this investigation. Drilling mud was not present in this mud pit, but a spill area was identified to the north of the mud pit. The spill area appeared to be drilling mud or bentonite/cement grout and was sampled as part of this investigation.

1.1.10 CAS 10-09-05

Corrective Action Site 10-09-05 is a mud pit located in Area 10. Historical documentation available for this mud pit does not indicate what drilling operation or test (if any) it might have supported. The configuration of the pit and surrounding area is similar to a borrow pit rather than a mud pit. The SAFER Plan identified drilling mud and associated constituents as the primary source of potential contamination, which are the focus of the investigation. Drilling mud was not observed in this mud pit supporting the assumption that this CAS was a borrow pit and not a mud pit.

1.1.11 CAS 10-09-06

Corrective Action Site 10-09-06 is a mud pit located east of the U-10am #5 potential crater in Area 10. This mud pit is believed to have supported drilling of the experimental hole U-10am #5 completed on June 21, 1969, and associated with the Tun-D Test sponsored by LLNL conducted on December 10, 1969. It is assumed that this mud pit was used during the pretest drilling of U-10am #5. The drilling mud and associated constituents are the primary source of potential contamination and the focus of this investigation. Drilling mud was not consistently present within this mud pit, but a spill area was identified in the northern portion of the mud pit. The spill area appeared to be drilling mud or bentonite/cement grout and was sampled as part of this investigation.

1.1.12 CAS 01-99-01

Corrective Action Site 01-99-01 is located in Area 1 and consists of Building 1-31.2e1. Wooden boxes and a network of metal pipes are inside the building. The building was constructed as a blast-resistant control room and support facility for Operation Teapot. Radionuclides from nuclear testing are the primary contaminants of potential concern at this site.

1.1.13 CAS 04-26-03

Corrective Action Sites 04-26-03 consists of lead bricks scattered to the west of T-4 Bunker in Area 4. The bricks are believed to be associated with the Apple-1, Fox, Kepler, and Nancy Tests that occurred from 1952 through 1957. The site is located within a posted Radioactive Materials Area (RMA) that contains fused radiologically contaminated soil (i.e., trinity glass). The lead bricks and associated lead are the contaminant of concern at this site. The lead bricks and associated soil were removed and contained as part of the investigation.

1.1.14 CAS 25-15-01

Corrective Action Sites 25-15-01 is a waste dump located approximately 0.3 mi north of the Reactor Maintenance, Assembly, and Disassembly (R-MAD) Facility in Area 25. The waste dump is thought to have been constructed between 1976 and 1981. The waste dump may have been used as a disposal site prior to the Missile Experiment (MX) program and during the construction of the MX tower. The MX program operated at the R-MAD facility from 1978 to 1983. The waste dump was

reportedly used for the disposal of nonhazardous waste and construction debris. The dump is surrounded by piles of excavated soil. The contents contained in the waste dump are the primary source of potential contamination.

1.2 Scope

The scope of the corrective action activities conducted at CAU 357 included the following activities:

- Performed site preparation activities (e.g., utility clearances, radiological and geophysical surveys).
- Performed housekeeping activities for debris at various CASs, as required.
- Collected environmental samples from designated target populations, (i.e., mud/soil cuttings) and submit for laboratory analysis.
- Performed site investigation activities to define the nature and extent of contamination to select an appropriate corrective action alternative.
- Implemented a closure alternative and confirmed the closure option is sufficient to protect human health and the environment or selected an alternative closure option based on validated analytical data, site observations, and professional judgement.
- Conducted an inquiry on documentation necessary to close CAS 01-99-01 as a historical building.
- Closed the Waste Dump at CAS 25-15-01 in accordance with *Nevada Administrative Code* (NAC) regulations.

The cleanup criteria were established for CAU 357 to ensure that each release site will not pose an unacceptable risk to human health and the environment and that each site is in compliance with all applicable laws and regulations. The cleanup criteria are the risk-based cleanup goals defined herein as the final action levels (FALs). Except for arsenic at all CASs, lead at CAS 04-26-03, and radioisotopes at CASs 08-09-03, 10-09-02, and 10-09-06, the FALs for the constituents detected at CAU 357 are the conservative preliminary action levels (PALs) identified during the data quality objective (DQO) process. For chemical contaminants of potential concern (COPCs), PALs were based on U.S. Environmental Protection Agency (EPA) *Region 9 Industrial Preliminary Remediation Goals* (PRGs) (EPA, 2002) and 100 milligrams per kilogram (mg/kg) for hydrocarbon-impacted soil

(NAC, 2003). For radionuclides, PALs were based on the following dose-based, isotope-specific criteria (NNSA/NSO, 2003b).

- The PALs for all radioisotopes, except those covered by DOE Order 5400.5, were derived from the construction, commercial, industrial land-use scenario in Table 2.1 of the National Council on Radiation Protection and Measurements (NCRP) Report No. 129, *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document are based on a 25 millirem per year (mrem/yr) dose.
- The PALs for radium (Ra)-226, Ra-228, thorium (Th)-230, Th-232 and their progeny in secular equilibrium are the generic guidelines for residual concentrations as found in Chapter IV of DOE Order 5400.5, Change 2, "Radiation Protection of the Public and Environment" (DOE, 1993).

The FAL for arsenic is the background concentration for arsenic at NTS because natural concentrations at NTS exceed the Region 9 PRG. The background concentration for arsenic is considered to be the mean plus two times the standard deviation for sediment samples collected by the Nevada Bureau of Mines and Geology throughout the Nevada Test and Training Range (formerly the Nellis Air Force Range) (NBMG, 1998; Moore, 1999). The methods used to establish the FALs at CASs 08-09-03, 10-09-02, 10-09-06, and 04-26-03 are discussed in [Section 4.0](#).

1.3 Closure Report Contents

This CR was prepared to document the closure activities completed in accordance with the CAU 357 SAFER Plan (NNSA/NSO, 2003b). The CR is divided into the following sections and appendices:

[Section 1.0](#) - Introduction: Summarizes the purpose, scope, and contents of this CR.

[Section 2.0](#) - Closure Activities: Summarizes the closure activities, deviations from the SAFER Plan, the field schedule, and the site conditions following completion of corrective actions.

[Section 3.0](#) - Waste Disposition: Discusses the wastes generated and entered into an approved waste management system as a result of the corrective action.

[Section 4.0](#) - Closure Verification Results: Describes verification activities and the results of verification activities.

Section 5.0 - Conclusions and Recommendations: Provides the conclusions and recommendations along with the rationale for their determination.

Section 6.0 - References: Provides a list of all referenced documents used in the preparation of this CR.

Appendix A - *DQOs as Developed in the SAFER Plan for CAU 357*: documents the seven steps of the DQOs as presented in the SAFER Plan for CAU 357.

Appendix B - *Closure Certification for CAU 357*: documents the specific closure activities completed for the CAU.

Appendix C - *As-Built Documentation for CAU 357*: identifies the as-built drawings for each CAS.

Appendix D - *Sample Analytical Results for CAU 357*: provides a summary of the sample analytical results.

Appendix E - *Waste Disposition Documentation for CAU 357*: documents disposal of items removed during closure activities.

Appendix F - *Modifications to the Post-Closure Plan for CAU 357*: documents any modifications to the Post-Closure Plan.

Appendix G - *Use Restrictions for CAU 357*: documents the use restrictions for CAU 357.

Appendix H - *Visual Sample Plan Calculation Results for CAU 357, CAS 07-09-03*: documents the results for CAS 07-09-03.

Appendix I - *Residual Radiation (RESRAD) Computer Code Calculation Results for CAU 357*: documents the methods and calculations used to determine the risk-based FALs at CASs 08-09-03, 10-09-02, and 10-09-06.

Appendix J - *Closure Recommendation for CAS 04-26-03*: documents the information that supports the closure recommendation of close in place.

1.3.1 Supporting Documentation

To ensure all project objectives, health and safety requirements, and quality control procedures were adhered to, all closure activities were performed in accordance with the following documents:

- *Streamlined Approach for Environmental Restoration Plan for CAU 357, Mud Pits and Waste Dump, Nevada Test Site, Nevada* (NNSA/NSO, 2003b)
- Record of Technical Change (ROTC) No. 1 for the SAFER Plan for CAU 357, *Mud Pits and Waste Dump* dated March 10, 2004
- *Industrial Sites Quality Assurance Project Plan* (QAPP) (NNSA/NV, 2002)
- *Federal Facility Agreement and Consent Order* (1996), as amended
- Approved standard quality practices and detailed operating procedures

1.3.2 Data Quality Objectives

The DQOs as identified in the SAFER Plan are as follows:

- Determine whether contaminants of concern (COPCs) are present.
- If COCs are present, determine their extent.
- Provide sufficient information and data supporting the preferred closure alternative.

Two general conceptual site models (CSMs) were developed for the CASs associated with CAU 357. The CSMs describe the most probable current conditions at each CAS and define the assumptions that were the basis for identifying the appropriate sampling strategy at each CAS. Development of the CSMs included assessing how potential contaminants could reach receptors that required addressing contaminant nature and extent, transport mechanisms and pathways, potential receptors, and potential exposures points to receptors. The key assumptions used to develop the CSMs were reconciled as part of the Data Quality Assessment (DQA) provided in [Section 4.1](#).

2.0 Closure Activities

Corrective action activities were conducted to support the closure alternatives proposed in the CAU 357 SAFER Plan (NNSA/NSO, 2003b). Closure alternatives were selected during the DQO process and were based on available information that included contaminants of potential concern, future land use, and assumed risk. The closure alternatives selected for this CAU are provided below:

- No further action. This closure alternative was selected for CASs with no detections of COPCs above the PALs.
- Clean closure. this closure alternative was selected for CASs with COCs above the FALs having been remediated and verification samples collected to support the implemented remediation strategy.
- Close in place with administrative controls. This closure alternative was recommended for CASs having detections of COCs above the FALs with the nature and extent of contamination defined.

Individual sample results were used to compare to the action levels during the investigation. Section 0.4.4 of the EPA's *Data Quality Objectives for Hazardous Waste Site Investigations* (EPA, 2000a) guidance states that the use of statistical methods may not be warranted by program guidelines or site-specific sampling objectives. The need for statistical methods is dependent on the decisions being made. Section 7.1 of the EPA QA G-4HW guidance (2000a) states that a nonprobabilistic (judgemental) sampling design is developed when there is sufficient information on the contamination sources and history to develop a valid CSM and to select specific locations. This design was used to confirm the existence of contamination at specific sampling locations and provide information (such as extent of contamination) about specific areas of the site.

Confidence in judgmental sampling results is established qualitatively by the validation of the CSM developed and concurred to by the stakeholder participants (U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office [NNSA/NSO] and Nevada Division of Environmental Protection [NDEP]) based on closure sampling results and assessing the validity of DQO decisions using the DQA process. The following sections provide a description of corrective action activities conducted at each CAS, deviations from the SAFER Plan, a completed schedule of corrective action activities, and site plan figures.

2.1 Description of Corrective Action Activities

Corrective action activities were performed as set forth in the CAU 357 SAFER Plan (NNSA/NSO, 2003b) from August 2004 through January 2005. Corrective action activities included the following:

- Performed radiological walk-over surveys for all CASs, except CASs 01-99-01 and 10-09-05, prior to initiating the field activities. The radiological surveys were conducted to determine if contamination was present in surface soil at concentrations statistically greater than surface soil from undisturbed background locations.
- Performed geophysical surveys at all CASs except CAS 01-99-01 and 10-09-05. The geophysical surveys were conducted to determine the configuration of mud pits/waste dump, to locate potential anomalies to assist in the selection of biased sample locations, and to identify debris/lead bricks for removal.
- Identified sample locations using biasing factors that included visual observations (e.g., staining), surface features (topographic high/low in the mud pits), geophysical survey results, and radiological survey results. Sample locations at CAS 07-09-03 were selected using the Visual Sampling Plan (VSP) to calculate the number and random location of samples. The justifications for selecting sample locations are provided in [Section 4.1.1.1](#). A copy of the report summarizing the sampling design and associated statistical assumptions for the selection of random sample locations at CAS 07-09-03 is provided in [Appendix H](#).
- Identified subsurface soil sample locations using biasing factors that included staining, elevated field-screening results, and distinct changes in soil lithology (above and below mud/native soil contact within the mud pits).
- Screened select soil samples for volatile organic compounds (VOCs), alpha and beta/gamma radiation, and total petroleum hydrocarbons (TPH). Field screening was conducted for worker protection and to assist in the selection of samples for laboratory analysis.
- Submitted soil samples for laboratory analysis to determine the nature and extent of COPCs at each CAS. This included the collection of quality control (QC) samples for laboratory analyses to ensure that the data generated from the analysis of closure sampling meet the requirements of the DQIs.
- Performed housekeeping activities that included the removal of surface debris at CASs 07-09-02, 07-09-03, 07-09-05, 08-09-01, 08-09-03, 10-09-02, 10-09-04, 10-09-05, and 10-09-06. The surface debris included metal cables, water pipe, hoses, tarps, wood, fiberglass piping, 55-gallon drums, drill-rod stands, and orange fencing. All debris was visually assessed for potential contamination and surveyed for potential radiological concerns prior to removal. A gas cylinder was identified at CAS 04-26-03 and was not removed as part of the

housekeeping activities. The gas cylinder is not a source of contamination and is not part of this CAS.

- Collected waste management samples at CASs 08-09-03, 10-09-02, and 04-26-03.
- Identified sample location coordinates using a Global Positioning System (GPS).
- Completed an inquiry on the documentation required for the Building 1-31.2e1 at CAS 01-99-01 to be registered as a historic building. The building is currently part of the Apple-2 Historic District; therefore, no further documentation is required (DRI, 2000).

The following sections summarize sampling activities conducted at each CAS as part of the CAU 357 closure activities. Soil samples selected for laboratory analysis were submitted to Paragon Analytical, Inc. to be analyzed for COPCs as specified in the CAU 357 SAFER Plan (NNSA/NSO, 2003b). The results of the closure activities and implemented closure strategy with verification sample results are provided in [Section 4.0](#). A DQA was conducted to determine if the DQOs were met and if the DQO decisions were resolved at the desired level of confidence. The results of the DQA are provided in [Section 4.1](#).

2.1.1 CAS 07-09-02, Mud Pit

Corrective action activities conducted at this CAS included the collection of soil samples for chemical and radiological analysis. Nine Decision I soil samples (including duplicates) were collected from three locations (A01, A02, and A03) within the mud pit. A surface soil sample was collected from each location at a depth of 0 to 6 inches (in.) below ground surface (bgs) using dedicated disposable scoops. These samples were all collected from the drilling mud within the mud pit. The drilling mud extended to a depth that ranged from approximately 12 to 14 in. bgs across the mud pit. Subsurface soil samples were collected at locations A01, A02, and A03. These samples were collected from the mud at the mud/native soil contact and from native soil below the mud/native soil contact. Subsurface soil samples were collected using a hand auger.

No Decision II soil samples or waste management samples were collected at this CAS. A summary of the samples collected at CAS 07-09-02 is provided in [Table 2-1](#). [Figure 2-1](#) is a map showing sample locations with the corresponding soil sample identifications collected from each sample location.

Table 2-1
Samples Collected at CAS 07-09-02, Mud Pit

Sample Location	Sample Number	Depth (in. bgs)	Matrix	Purpose	Analyses
A01	357A001	0 - 6	Drilling Mud	Environmental	Set 1
	357A002	12 - 18	Native Soil	Environmental	Set 1
A02	357A003	0 - 6	Drilling Mud	Environmental	Set 1
	357A004	8 - 14	Drilling Mud	Environmental	Set 1
	357A005	8 - 14	Drilling Mud	Field Duplicate of #357A004	Set 1
	357A006	15 - 20	Native Soil	Environmental	Set 1
A03	357A007	0 - 6	Drilling Mud	Environmental	Set 1
	357A008	10 - 14	Drilling Mud	Environmental, MS/MSD	Set 1
	357A009	15 - 20	Native Soil	Environmental	Set 1
NA	357A301	NA	Water	Field Blank	Set 1
NA	357A302	NA	Water	Trip Blank	Total VOCs

Set 1 = Total VOCs, Total SVOCs, Total RCRA Metals, TPH-DRO, PCBs, Gamma Spectroscopy, Isotopic Uranium, Isotopic Plutonium, Strontium-90

in. bgs = Inches below ground surface

MS/MSD = Matrix spike/matrix spike duplicate

NA = Not applicable

2.1.2 CAS 07-09-03, Mud Pit

Corrective action activities conducted at this CAS included the collection of soil samples for chemical and radiological analysis. A total of 33 Decision I soil samples (including duplicates) were collected from 15 locations (B01 through B15) within the mud pit. A surface soil sample was collected from each location at a depth of 0 to 6 in. bgs using dedicated disposable scoops. Drilling mud was observed at all sample locations except B06, B07, and B15. The surface samples collected at these locations were from native soil. Drilling mud was observed at the remaining sample locations ranging in depth from approximately 1 to 2 ft bgs. Subsurface soil samples were collected from these locations from the mud at the mud/native soil contact and from native soil below the mud/native soil contact. Subsurface soil samples were collected using a hand auger.

Four step-out soil samples were collected from four locations at this CAS. The soil samples were collected to assess the extent of isotopic plutonium (Pu)-239 detected in soil sample 357B015 collected at location B07. The soil sample 357B034 was a subsurface soil sample collected to define

Figure 2-1
CAU 357, CAS 07-09-02, Mud Pit

the vertical extent of Pu-239 at location B07. The soil samples 357B035, 357B036, and 357B038 were surface soil samples collected to define the lateral extent of Pu-239 in the area of B07. These samples were collected at locations B16, B17, and B18, respectively. The soil samples were submitted to Paragon to be analyzed for gamma spectroscopy and isotopic Pu. No waste management samples were collected at this CAS. A summary of the soil samples collected at CAS 07-09-03 is provided in Table 2-2. Figure 2-2 is a map showing sample locations with the corresponding soil sample identifications collected from each sample location.

Table 2-2
Samples Collected at CAS 07-09-03, Mud Pit
(Page 1 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	Analyses
B01	357B001	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357B002	1.5 - 2.0	Drilling Mud	Environmental, MS/MSD	Set 1
	357B003	3.0 - 3.5	Native Soil	Environmental	Set 1
B02	357B004	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357B005	1.0 - 1.5	Drilling Mud	Environmental	Set 1
	357B006	1.0 - 1.5	Drilling Mud	Field Duplicate of #357B005	Set 1
	357B007	2.5 - 3.0	Native Soil	Environmental	Set 1
B03	357B008	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357B009	1.0 - 1.5	Native Soil	Environmental	Set 1
B04	357B010	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357B011	1.0 - 1.5	Native Soil	Environmental	Set 1
B05	357B012	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357B013	1.0 - 1.5	Native Soil	Environmental	Set 1
B06	357B014	0.0 - 0.5	Native Soil	Environmental	Set 1
B07	357B015	0.0 - 0.5	Native Soil	Environmental	Set 1
	357B034	1.0 - 1.5	Native Soil	Environmental	Isotopic Plutonium, Gamma Spectroscopy
B08	357B016	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357B017	1.0 - 1.5	Native Soil	Environmental	Set 1
B09	357B018	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357B019	1.0 - 1.5	Native Soil	Environmental	Set 1
B10	357B020	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357B021	1.0 - 1.5	Native Soil	Environmental, MS/MSD	Set 1

Table 2-2
Samples Collected at CAS 07-09-03, Mud Pit
(Page 2 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	Analyses
B11	357B022	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357B023	0.0 - 0.5	Drilling Mud	Field Duplicate of #357B022	Set 1
	357B024	1.5 - 2.0	Drilling Mud	Environmental	Set 1
	357B025	2.5 - 3.0	Native Soil	Environmental	Set 1
B12	357B026	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357B027	1.5 - 2.0	Drilling Mud	Environmental	Set 1
	357B028	2.5 - 3.0	Native Soil	Environmental	Set 1
B13	357B029	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357B030	1.0 - 1.5	Native Soil	Environmental	Set 1
B14	357B031	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357B032	1.0 - 1.5	Native Soil	Environmental	Set 1
B15	357B033	0.0 - 0.5	Native Soil	Environmental	Set 1
B16	357B035	0.0 - 0.5	Native Soil	Environmental	Isotopic Plutonium, Gamma Spectroscopy
B17	357B036	0.0 - 0.5	Native Soil	Environmental	Isotopic Plutonium, Gamma Spectroscopy
B18	357B037	0.0 - 0.5	Native Soil	Environmental	Isotopic Plutonium, Gamma Spectroscopy
NA	357B301	NA	Water	Trip Blank	Total VOCs
NA	357B302	NA	Water	Field Blank	Set 1
NA	357B303	NA	Water	Trip Blank	Total VOCs

Set 1 = Total VOCs, Total SVOCs, Total RCRA Metals, TPH-DRO, PCBs, Gamma Spectroscopy, Isotopic Uranium, Isotopic Plutonium, Strontium-90

ft bgs = Feet below ground surface
MS/MSD = Matrix spike/matrix spike
NA = Not applicable

2.1.3 CAS 07-09-04, Mud Pit

Corrective action activities conducted at this CAS included the collection of soil samples for chemical and radiological analysis. Twelve Decision I soil samples (including duplicates) were collected from five locations (C01, C02, C03, C04, and C05) within the mud pit. A surface soil sample was collected from each location at a depth of 0 to 6 in. bgs using dedicated disposable

scoops. The surface soil samples collected from locations C01, C02, and C03 were located in the mud pit. The mud thickness was measured at these locations at depths ranging from approximately 1 to 1.5 ft bgs across the mud pit. Subsurface soil samples were collected at these locations from the mud at the mud/native soil contact and from native soil below the mud/native soil contact. The sample locations C04 and C05 were located below the pipe outfalls on the southern berm of the mud pit. Subsurface soil samples were collected using a hand auger.

No Decision II soil samples or waste management samples were collected at this CAS during the CAU 357 investigation. A summary of the soil samples collected at CAS 07-09-04 is provided in [Table 2-3](#). [Figure 2-3](#) is a map showing sample locations with the corresponding soil sample identifications collected from each sample location.

Table 2-3
Samples Collected at CAS 07-09-04, Mud Pit

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	Analyses
C01	357C001	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357C002	1.0 - 1.5	Drilling Mud	Environmental, MS/MSD	Set 1
	357C003	2.0 - 2.5	Native Soil	Environmental	Set 1
C02	357C004	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357C005	1.0 - 1.5	Native Soil	Environmental	Set 1
	357C006	1.0 - 1.5	Native Soil	Field Duplicate of #357C005	Set 1
C03	357C007	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357C008	1.0 - 1.5	Native Soil	Environmental	Set 1
C04	357C009	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357C010	1.0 - 1.5	Native Soil	Environmental	Set 1
C05	357C011	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357C012	1.0 - 1.5	Native Soil	Environmental	Set 1
NA	357C301	NA	Water	Trip Blank	Total VOCs
NA	357C302	NA	Water	Field Blank	Set 1

Set 1 = Total VOCs, Total SVOCs, Total RCRA Metals, TPH-DRO, PCBs, Gamma Spectroscopy, Isotopic Uranium, Isotopic Plutonium, Strontium-90

ft bgs = Feet below ground surface
MS/MSD = Matrix spike/matrix spike recovery
NA = Not applicable

Figure 2-3
CAU 357, CAS 07-09-04, Mud Pit

2.1.4 CAS 07-09-05, Mud Pit

Corrective action activities conducted at this CAS included the collection of soil samples for chemical and radiological analysis. Eight Decision I soil samples were collected from three locations (D01, D02, and D03) within the mud pit. A surface soil sample was collected from each location at a depth of 0 to 6 in. bgs using dedicated disposable scoops. These samples were all collected from the drilling mud within the mud pit. The drilling mud extended to a depth that ranged from approximately 1 to 1.5 ft bgs across the mud pit. Subsurface soil samples were collected at these locations from the mud at the mud/native soil contact and from native soil below the mud/native soil contact. Subsurface soil samples were collected using a hand auger.

No Decision II soil samples or waste management samples were collected at this CAS during the CAU 357 investigation. A summary of the soil samples collected at CAS 07-09-05 is provided in [Table 2-4](#). [Figure 2-4](#) is a map showing sample locations with corresponding soil sample identifications collected from each location.

Table 2-4
Samples Collected at CAS 07-09-05, Mud Pit

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	Analyses
D01	357D001	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357D002	1.0 - 1.5	Drilling Mud	Environmental	Set 1
	357D003	1.5 - 2.0	Native Soil	Environmental	Set 1
D02	357D004	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357D005	1.0 - 1.5	Drilling Mud	Environmental	Set 1
	357D006	1.5 - 2.0	Native Soil	Environmental	Set 1
D03	357D007	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357D008	1.0 - 1.5	Native Soil	Environmental	Set 1
NA	357D301	NA	Water	Trip Blank	Total VOCs
NA	357D302	NA	Water	Field Blank	Set 1
NA	357D303	NA	Water	Source Blank	Set 1

Set 1 = Total VOCs, Total SVOCs, Total RCRA Metals, TPH-DRO, PCBs, Gamma Spectroscopy, Isotopic Uranium, Isotopic Plutonium, Strontium-90

ft bgs = Feet below ground surface
NA = Not applicable

Figure 2-4
CAU 357, CAS 07-09-05, Mud Pit Site Map

2.1.5 CAS 08-09-01, Mud Pit

Corrective action activities conducted at this CAS included the collection of soil samples for chemical and radiological analysis. Nine Decision I soil samples were collected from five locations (E01, E02, E03, E04, and E09) within the mud pit. Sample location E04 was selected for sampling based on the visual observation of staining and oil filter debris on the surface. Surface soil samples were collected at each location from depths of 0.0 to 0.5 ft bgs using dedicated disposable scoops. These samples were collected from the drilling mud within the mud pit. The drilling mud extended to a depth that ranged from approximately 0.5 to 0.8 ft bgs across the mud pit. Subsurface soil samples were collected at locations E01, E02, and E04. These samples were collected from native soil below the mud/native soil contact using a hand auger. An additional soil sample was collected from location E04 at a depth of 1.5 to 2.0 ft bgs based on field-screening results for TPH.

A total of 13 Decision II soil samples were collected from 5 locations (E04 through E08) at this CAS. The samples were collected to characterize the lateral and vertical extent of TPH-diesel-range organics (DRO) detected in soil sample 357E006 collected at location E04. The soil samples 357E009, 357E017, 357E020, and 357E021 were collected to define the vertical extent of TPH-DRO in soil at location E04. The remaining nine soil samples were collected from locations E05, E06, E07, and E08 to define the lateral extent of TPH-DRO. The Decision II soil samples were collected using a backhoe and were submitted to Paragon to be analyzed for TPH-DRO. No waste management samples were collected at this CAS. A summary of the soil samples collected at CAS 08-09-01 is provided on [Table 2-5](#). [Figure 2-5](#) is the map showing sample locations with corresponding soil sample identifications collected from each location.

Table 2-5
Samples Collected at CAS 08-09-01, Mud Pit
(Page 1 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	Analyses
E01	357E001	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357E002	0.5 - 1.0	Native Soil	Environmental	Set 1
E02	357E003	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357E004	0.7 - 1.2	Native Soil	Environmental	Set 1
E03	357E005	0.0 - 0.5	Drilling Mud	Environmental	Set 1

Table 2-5
Samples Collected at CAS 08-09-01, Mud Pit
(Page 2 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	Analyses
E04	357E006	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357E007	0.8 - 1.2	Native Soil	Environmental	Set 1
	357E008	1.5 - 2.0	Native Soil	Environmental	Set 1
	357E009	3.0 - 3.5	Native Soil	Environmental, MS/MSD	TPH-DRO
	357E017	4.5 - 5.0	Native Soil	Environmental	TPH-DRO
	357E020	5.5 - 6.0	Native Soil	Environmental	TPH-DRO
	357E021	8.0 - 8.5	Native Soil	Environmental	TPH-DRO
E05	357E010	1.0 - 1.5	Native Soil	Environmental	TPH-DRO
	357E011	1.0 - 1.5	Native Soil	Field Duplicate of #357E010	TPH-DRO
E06	357E012	1.0 - 1.5	Native Soil	Environmental	TPH-DRO
	357E016	2.5 - 3.0	Native Soil	Environmental	TPH-DRO
	357E019	5.0 - 5.5	Native Soil	Environmental	TPH-DRO
	357E022	8.0 - 8.5	Native Soil	Environmental	TPH-DRO
E07	357E013	1.0 - 1.5	Native Soil	Environmental	TPH-DRO
E08	357E014	1.0 - 1.5	Native Soil	Environmental	TPH-DRO
	357E018	3.0 - 3.5	Native Soil	Environmental	TPH-DRO
E09	357E015	0.0 - 0.5	Drilling Mud	Environmental	Set 1
NA	357E301	NA	Water	Trip Blank	Total VOCs
NA	357E302	NA	Water	Field Blank	Set 1
NA	357E303	NA	Water	Trip Blank	Total VOCs
NA	357E304	NA	Water	Trip Blank	Total VOCs
NA	357E305	NA	Water	Trip Blank	Total VOCs
NA	357E306	NA	Water	Source Blank	TPH-DRO
NA	357E307	NA	Water	Equipment Rinsate Blank	TPH-DRO

Set 1 = Total VOCs, Total SVOCs, Total RCRA Metals, TPH-DRO, PCBs, Gamma Spectroscopy, Isotopic Uranium, Isotopic Plutonium, Strontium-90

ft bgs = Feet below ground surface
MS/MSD = Matrix spike/matrix spike recovery
NA = Not applicable

Figure 2-5
CAU 357, CAS 08-09-01, Mud Pit

2.1.6 CAS 08-09-02, Mud Pit

Corrective action activities conducted at this CAS included the collection of soil samples for chemical and radiological analysis. Six Decision I soil samples were collected from three locations (F01, F02, and F03) within the mud pit. A surface soil sample was collected at each location from depths of 0.0 to 0.5 ft bgs using dedicated disposable scoops. These samples were all collected from the drilling mud within the mud pit. The drilling mud extended to a depth of approximately 1 ft bgs across the mud pit. Subsurface soil samples were collected at these locations from the native soil below the mud/native soil contact. Subsurface soil samples were collected using a hand auger.

No Decision II soil samples or waste management samples were collected at this CAS. A summary of the soil samples collected during the investigation at CAS 08-09-02 is provided in [Table 2-6](#). [Figure 2-6](#) is the map showing sample locations with corresponding soil sample identifications collected from each location.

Table 2-6
Samples Collected at CAS 08-09-02, Mud Pit

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	Analyses
F01	357F001	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357F002	1.0 - 1.5	Native Soil	Environmental, MS/MSD	Set 1
F02	357F003	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357F004	1.0 - 1.5	Native Soil	Environmental	Set 1
F03	357F005	0.0 - 0.5	Drilling Mud	Environmental	Set 1
	357F006	1.0 - 1.5	Native Soil	Environmental	Set 1
NA	357F301	NA	Water	Trip Blank	Total VOCs
NA	357F302	NA	Water	Field Blank	Set 1

Set 1 = Total VOCs, Total SVOCs, Total RCRA Metals, TPH-DRO, PCBs, Gamma Spectroscopy, Isotopic Uranium, Isotopic Plutonium, Strontium-90

ft bgs = Feet below ground surface
MS/MSD = Matrix spike/matrix spike recovery
NA = Not applicable

Figure 2-6
CAU 357, CAS 08-09-02, Mud Pit

2.1.7 CAS 08-09-03, Mud Pit

Corrective action activities conducted at this CAS included the collection of soil samples for chemical and radiological analysis. Nine Decision I soil samples (including duplicates) were collected from four locations (G01, G02, G03, and G04) within the mud pit. Surface soil samples were collected at each location from depths of 0 to 6 in. bgs using dedicated disposable scoops. These samples were all collected from the drilling mud within the mud pit. The drilling mud extended to a depth of approximately 6 in. bgs across the mud pit. Subsurface soil samples were collected at each location from the native soil below the mud/native soil contact. Subsurface soil samples were collected using a hand auger.

No Decision II soil samples were collected at this CAS. Two waste management samples (357G501 and 357G502) were collected at this CAS. The waste management samples were collected to characterize soil associated with the water pipe that was removed during housekeeping activities. A summary of the soil samples collected at CAS 08-09-03 is provided in [Table 2-7](#). [Figure 2-7](#) is the map showing sample locations with corresponding soil sample identifications collected from each location.

2.1.8 CAS 10-09-02, Mud Pit

Corrective action activities conducted at this CAS included the collection of soil samples for chemical and radiological analysis. A total of 16 Decision I soil samples (including duplicates) were collected from six locations (H01 through H06) at this CAS. Surface soil samples were collected at locations H01, H02, H03, and H04 from depths of 0 to 6 in. bgs using dedicated disposable scoops. The samples collected at locations H01, H02, and H03 were all collected from within Mud Pit A. The drilling mud at these locations extended to a depth of approximately 22 in. bgs across the mud pit. Subsurface samples collected from these locations were collected from the mud at the mud/native soil contact and from native soil below the mud/native soil contact. The surface soil sample collected from location H04 in Mud Pit B contained both drilling mud and native soil. A subsurface soil sample was collected from native soil at this location from a depth of 10 to 14 in. bgs. The samples collected from locations H05 and H06 were located below the pipe outfalls between Mud Pit A and Mud Pit B. These samples were collected from native soil. Subsurface soil samples were collected using a hand auger.

Table 2-7
Samples Collected at CAS 08-09-03, Mud Pit

Sample Location	Sample Number	Depth (in. bgs)	Matrix	Purpose	Analyses
G01	357G001	0 - 6	Drilling Mud	Environmental	Set 1
	357G002	6 - 12	Native Soil	Environmental	Set 1
G02	357G003	0 - 6	Drilling Mud	Environmental	Set 1
	357G004	6 - 12	Native Soil	Environmental	Set 1
G03	357G005	0 - 6	Drilling Mud	Environmental	Set 1
	357G006	6 - 12	Native Soil	Environmental	Set 1
	357G007	6 - 12	Native Soil	Field Duplicate of #357G006	Set 1
G04	357G008	0 - 6	Drilling Mud	Environmental	Set 1
	357G009	8 - 12	Native Soil	Environmental	Set 1
NA	357G301	NA	Water	Trip Blank	Total VOCs
NA	357G302	NA	Water	Field Blank	Set 1
Pipe #3	357G501	NA	Soil	WM	Set 1
Pipe #4	357G502	NA	Soil	WM	Set 1

Set 1 = Total VOCs, Total SVOCs, Total RCRA Metals, TPH-DRO, PCBs, Gamma Spectroscopy, Isotopic Uranium, Isotopic Plutonium, Strontium-90

in. bgs = Inches below ground surface
NA = Not applicable
WM = Waste management

No Decision II soil samples were collected at this CAS. Three waste management samples (357H501, 357H502, and 357H503) were collected at this CAS. The waste management samples 357H501 and 357H502 were collected to characterize soil associated with tarps removed during housekeeping activities. The waste management sample 357H503 was collected to characterize rinsate generated from the decontamination of equipment used during the investigation. A summary of the samples collected at CAS 10-09-02 is provided in [Table 2-8](#). [Figure 2-8](#) is the map showing sample locations with corresponding soil sample identifications collected from each location.

2.1.9 CAS 10-09-04, Mud Pit

Corrective action activities conducted at this CAS included the collection of soil samples for chemical and radiological analysis. Three Decision I soil samples were collected from three locations

Figure 2-7
CAU 357, CAS 08-09-03, Mud Pit

Table 2-8
Samples Collected at CAS 10-09-02, Mud Pit

Sample Location	Sample Number	Depth (in. bgs)	Matrix	Purpose	Analyses
H01	357H001	0 - 6	Drilling Mud	Environmental	Set 1
	357H002	16 - 22	Drilling Mud	Environmental	Set 1
	357H003	30 - 42	Native Soil	Environmental	Set 1
H02	357H004	0 - 6	Drilling Mud	Environmental	Set 1
	357H005	16 - 22	Drilling Mud	Environmental	Set 1
	357H006	30 - 42	Native Soil	Environmental	Set 1
H03	357H007	0 - 6	Drilling Mud	Environmental	Set 1
	357H008	0 - 6	Drilling Mud	Field Duplicate of #357H007	Set 1
	357H009	16 - 22	Drilling Mud	Environmental	Set 1
	357H010	30 - 42	Native Soil	Environmental	Set 1
H04	357H011	0 - 6	Drilling Mud	Environmental	Set 1
	357H012	10 - 14	Native Soil	Environmental	Set 1
H05	357H013	14 - 16	Native Soil	Environmental	Set 1
	357H014	20 - 24	Native Soil	Environmental	Set 1
H06	357H015	14 - 16	Native Soil	Environmental	Set 1
	357H016	20 - 24	Native Soil	Environmental, MS/MSD	Set 1
NA	357H301	NA	Water	Trip Blank	Total VOCs
NA	357H302	NA	Water	Field Blank	Set 1
NA	357H501	NA	Soil	WM	Set 1
NA	357H502	NA	Soil	WM	Set 1

Set 1 = Total VOCs, Total SVOCs, Total RCRA Metals, TPH-DRO, PCBs, Gamma Spectroscopy, Isotopic Uranium, Isotopic Plutonium, Strontium-90

in. bgs = Inches below ground surface
MS/MSD = Matrix spike/matrix spike recovery
NA = Not applicable
WM = Waste management

(I01, I02, and I03) at this CAS. A surface soil sample was collected at each location from depths of 0.0 to 0.5 ft bgs using dedicated disposable scoops. The samples collected at locations I01 and I02 were located within the mud pit. No drilling mud was visible within this mud pit, subsequently the samples collected from within the mud pit were from native soil. The soil sample collected at location I03 was collected from a spill area that appeared to be drilling mud outside the mud pit. No subsurface soil samples were collected at this CAS.

Figure 2-8
CAU 357, CAS 10-09-02, Mud Pit

No Decision II soil samples or waste management samples were collected at this CAS. A summary of the samples collected during the investigation at CAS 10-09-04 is provided in [Table 2-9](#).

[Figure 2-9](#) is the map showing sample locations with corresponding soil sample identifications collected from each location.

Table 2-9
Samples Collected at CAS 10-09-04, Mud Pit

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	Analyses
I01	357I001	0.0 - 0.5	Native Soil	Environmental	Set 1
I02	357I002	0.0 - 0.5	Native Soil	Environmental	Set 1
I03	357I003	0.0 - 0.5	Drilling Mud	Environmental	Set 1
NA	357I301	NA	Water	Field Blank	Set 1

Set 1 = Total VOCs, Total SVOCs, Total RCRA Metals, TPH-DRO, PCBs, Gamma Spectroscopy, Isotopic Uranium, Isotopic Plutonium, Strontium-90

ft bgs = Feet below ground surface
NA = Not applicable

2.1.10 CAS 10-09-05, Mud Pit

Corrective action activities conducted at this CAS included the collection of soil samples for chemical and radiological analysis. Two Decision I soil samples were collected at two locations (J01 and J02) within the mud pit. A surface soil sample was collected at each location from depths of 0.0 to 0.5 ft bgs using dedicated disposable scoops. No drilling mud was visible within this mud pit, subsequently the samples were collected from native soil. No subsurface soil samples were collected at this CAS.

No Decision II soil samples or waste management samples were collected at this CAS. A summary of the samples collected during the investigation at CAS 10-09-05 is provided in [Table 2-10](#).

[Figure 2-10](#) is the map showing sample locations with corresponding soil sample identifications collected from each location.

2.1.11 CAS 10-09-06, Mud Pit; Stains; Material

Corrective action activities conducted at this CAS included the collection of soil samples for chemical and radiological analysis. Four Decision I soil samples (including duplicates) were

Figure 2-9
CAU 357, CAS 10-09-04, Mud Pit

Table 2-10
Samples Collected at CAS 10-09-05, Mud Pit

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	Analyses
J01	357J001	0.0 - 0.5	Native Soil	Environmental	Set 1
J02	357J002	0.0 - 0.5	Native Soil	Environmental	Set 1
NA	357J301	NA	Water	Trip Blank	Total VOCs
NA	357J302	NA	Water	Field Blank	Set 1
NA	357J303	NA	Water	Equipment Rinsate Blank	Set 1
NA	357J304	NA	Water	Equipment Rinsate Blank	Set 1

Set 1 = Total VOCs, Total SVOCs, Total RCRA Metals, TPH-DRO, PCBs, Gamma Spectroscopy, Isotopic Uranium, Isotopic Plutonium, Strontium-90

ft bgs = Feet below ground surface
NA = Not applicable

collected at three locations (K01, K02, and K03) within the mud pit. A surface soil sample was collected at each location from depths of 0.0 to 0.5 ft bgs using dedicated disposable scoops. No drilling mud was visible within this mud pit, subsequently the samples were collected from native soil within the mud pit. No subsurface soil samples were collected at locations K01, K02, and K03.

Two Decision II soil samples (357K005 and 357K006) were collected at location K04 at this CAS. Soil samples collected from location K04 were collected to define the vertical extent of cobalt (Co)-60 within the mud pit. Soil sample 357K005 was a surface soil sample collected from 0 to 0.5 ft bgs using dedicated disposable scoops. Soil sample 357K006 was a subsurface sample collected from 1.5 to 2.0 ft bgs using a hand auger. The Decision II soil samples were submitted to Paragon to be analyzed for gamma spectroscopy. No waste management samples were collected at this CAS. A summary of the soil samples collected at CAS 10-09-06 is provided in [Table 2-11](#). [Figure 2-11](#) is the map showing sample locations with corresponding soil sample identifications collected from each location.

2.1.12 CAS 01-99-01, Boxes; Pipes

Corrective action activities conducted at this CAS included a radiological survey of the interior of Building 1-31.2e1 and collection of soil samples for radiological analysis. The radiological survey

Figure 2-10
CAU 357, CAS 10-09-05, Mud Pit

Table 2-11
Samples Collected at CAS 10-09-06, Mud Pit; Stains; Materials

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	Analyses
K01	357K001	0.0 - 0.5	Native Soil	Environmental, MS/MSD	Set 1
K02	357K002	0.0 - 0.5	Native Soil	Environmental	Set 1
	357K003	0.0 - 0.5	Native Soil	Field Duplicate of #357K002	Set 1
K03	357K004	0.0 - 0.5	Native Soil	Environmental	Set 1
K04	357K005	0.0 - 0.5	Native Soil	Environmental	Gamma Spectroscopy
	357K006	1.5 - 2.0	Native Soil	Environmental	Gamma Spectroscopy
NA	357K301	NA	Water	Field Blank	Set 1

Set 1 = Total VOCs, Total SVOCs, Total RCRA Metals, TPH-DRO, PCBs, Gamma Spectroscopy, Isotopic Uranium, Isotopic Plutonium, Strontium-90

ft bgs = Feet below ground surface

MS/MSD = Matrix spike/matrix spike recovery

NA = Not applicable

included collecting 10 swipe samples from the walls, boxes, pipes, and floor of the building. The radiological survey and analysis of swipe samples were conducted to determine presence and/or absence of radiological contamination in the building. Two Decision I soil samples were collected at two locations (L01 and L02) at this CAS. A surface soil sample was collected at each location from depths of 0.0 to 0.5 ft bgs using dedicated disposable scoops. No subsurface soil samples were collected at this CAS.

No Decision II soil samples or waste management samples were collected at this CAS. A summary of the samples collected at CAS 01-99-01 is provided in [Table 2-12](#). [Figure 2-12](#) is the map showing sample locations with corresponding soil sample identifications collected from each location.

2.1.13 CAS 04-26-03, Lead Bricks

Corrective action activities conducted at this CAS included the identification and removal of lead bricks, removal of soil associated with the lead bricks, and collection of soil samples for laboratory analysis. To assist in the identification of buried or partially buried lead bricks/debris geophysical surveys were conducted throughout the investigation. The initial geophysical survey was performed on August 18 and 19, 2004. The survey data were used to identify areas having high magnetic

Figure 2-11
CAU 357, CAS 10-09-06, Mud Pit; Stains; Materials

Table 2-12
Samples Collected at CAS 01-99-01, Boxes; Pipes

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	Analyses
L01	357L001	0.0 - 0.5	Soil	Environmental, MS/MSD	Set 2
L02	357L002	0.0 - 0.5	Soil	Environmental	Set 2
	357L003	0.0 - 0.5	Soil	Field Duplicate of #357L002	Set 2
NA	357L301	NA	Water	Equipment Rinsate Blank	Set 2
NA	357L302	NA	Water	Field Blank	Set 2

Set 2 = Gamma Spectroscopy, Isotopic Uranium, Isotopic Plutonium, Strontium-90

ft bgs = Feet below ground surface

MS/MSD = Matrix spike/matrix spike duplicate

NA = Not applicable

conductance. These areas were excavated using shovels and the lead/steel debris was removed. All locations having lead or lead debris were marked and identified using GPS, with the exception of the “high-density area.” The “high-density area” was identified as having greater than 400 lead bricks located too closely to collect coordinates for individual bricks. [Figure 2-13](#) is the map showing the initial geophysical survey results and “high-density area.”

A metal detector was also used during the investigation to assist in distinguishing lead from steel debris. Approximately 1,000 lead bricks or portions of lead bricks were identified during the investigation. The lead bricks or portion of lead bricks were removed and contained in B25 boxes on site. A minimum of two shovel scoops of soil were removed from below each lead brick or portion of lead brick. The soil was contained in 55-gallon drums and B25 boxes on site. A final geophysical survey was performed on November 4, 2004. This survey was conducted to verify removal of lead bricks. [Figure 2-14](#) is the map showing the final geophysical survey results and lead brick locations.

A total of 91 Decision I soil samples (including duplicates) were collected at 85 locations during the investigation. The soil samples were collected at discrete locations below former lead bricks or at surface locations between former lead bricks. The surface soil samples were collected from depths of 0 to 4 in. bgs using dedicated disposable scoops. These samples were collected to assess the distribution of lead at the surface. Decision I subsurface soil samples were collected after removing a minimum of two shovel scoops of soil. These soil samples were collected at maximum depths

Figure 2-12
CAU 357, CAS 01-99-01, Boxes; Pipes - "Building 1-31.2e1"

ranging from 6 to 8 in. bgs using dedicated disposable scoops. The subsurface soil samples were collected to assess the vertical extent of lead in soil below lead bricks.

A total of 30 Decision II soil samples (including duplicates) were collected from 17 sample locations having lead above the screening PAL. These soil samples were collected to verify the vertical extent of lead in soil. The Decision II soil samples were collected at depths ranging from 6 to 8 in. bgs to 22 to 24 in. bgs across the site. The soil at these locations was excavated using shovels and contained in 55-gallon drums and B25 boxes on site. A total of 12 waste management samples (357M501 through 357M512) were collected to characterize soil and lead bricks removed during the investigation. A summary of the samples collected at CAS 04-26-01 is provided in [Table 2-13](#). [Figure 2-15](#) is the map showing lead brick locations with corresponding soil sample locations.

2.1.14 CAS 25-15-01, Waste Dump

Corrective action activities conducted at this CAS included the advancement of four boreholes and collection of soil samples for chemical and radiological analysis. A total of 15 Decision I soil samples were collected as part of the corrective action investigation. Surface soil samples were collected at locations N01, N02, N03, N04, N05, and N06 from depths of 0.0 to 0.5 ft bgs using dedicated disposable scoops. Subsurface soil samples collected at locations N01, N02, N03, and N04 from depths ranging from approximately 2 to 20 ft bgs. These samples were collected to investigate the backfilled area of the waste dump. The samples were collected at the total depth of each borehole or approximately 2 ft below the estimated depth of the waste dump. The subsurface soil samples collected from boreholes N01 through N03 were collected using a rotosonic drill rig. The subsurface soil sample collected from borehole N04 was collected from within the excavated area of the waste dump using a hand auger. The samples collected at locations N05 and N06 were surface soil samples collected from within the excavated area of the waste dump.

Geophysical surveys were performed on Dirt Mounds #1, #3, and #4 to determine if materials may have been buried within the dirt mounds. The geophysical surveys did not identify any anomalies within the dirt mounds. Only a portion of Dirt Mound #2 could be surveyed due to the steepness of the mound. No anomalies were identified in the surveyed portion of this dirt mound. Soil samples collected at locations N07, N08, N09, and N10 were collected from Dirt Mounds #1, #2, #3, and #4,

Table 2-13
Samples Collected at CAS 04-26-03, Lead Bricks
(Page 1 of 5)

Sample Location	Sample Number	Depth (in. bgs)	Matrix	Purpose	Analyses
M01	357M001	0 - 4	Soil	Environmental	Lead
	357M002	0 - 4	Soil	Field Duplicate of #357M01	Lead
M02	357M003	0 - 4	Soil	Environmental, MS/MSD	Lead
M03	357M004	0 - 4	Soil	Environmental	Lead
	357M010	6 - 8	Soil	Environmental	Lead
	357M064	12 - 14	Soil	Environmental	Lead
	357M067	14 - 16	Soil	Environmental	Lead
	357M101	22 - 24	Soil	Environmental, MS/MSD	Lead
M04	357M005	0 - 4	Soil	Environmental	Lead
	357M034	6 - 7	Soil	Environmental	Lead
	357M061	7 - 8	Soil	Environmental	Lead
M05	357M006	0 - 4	Soil	Environmental	Lead
	357M062	6 - 8	Soil	Environmental	Lead
	357M063	12 - 14	Soil	Environmental	Lead
	357M102	18 - 20	Soil	Environmental	Lead
M06	357M007	0 - 4	Soil	Environmental	Lead
	357M018	6 - 8	Soil	Environmental	Lead
	357M103	12 - 14	Soil	Environmental	Lead
	357M104	12 - 14	Soil	Field Duplicate of #357M103	Lead
M07	357M008	0 - 4	Soil	Environmental	Lead
M08	357M009	0 - 4	Soil	Environmental	Lead
M11	357M011	6 - 8	Soil	Environmental	Lead
	357M105	14 - 16	Soil	Environmental	Lead
M12	357M012	4 - 6	Soil	Environmental	Lead
	357M013	6 - 8	Soil	Environmental	Lead
	357M109	18 - 20	Soil	Environmental	Lead
M13	357M014	4 - 6	Soil	Environmental	Lead
	357M015	6 - 8	Soil	Environmental	Lead
M14	357M016	4 - 6	Soil	Environmental	Lead
	357M017	6 - 8	Soil	Environmental	Lead
M15	357M019	0 - 4	Soil	Environmental	Lead
	357M108	6 - 8	Soil	Environmental	Lead
	357M110	14 - 16	Soil	Environmental	Lead

Table 2-13
Samples Collected at CAS 04-26-03, Lead Bricks
(Page 2 of 5)

Sample Location	Sample Number	Depth (in. bgs)	Matrix	Purpose	Analyses
M16	357M020	0 - 4	Soil	Environmental	Lead
	357M065	6 - 8	Soil	Environmental	Lead
	357M066	12 - 14	Soil	Environmental	Lead
	357M111	22 - 24	Soil	Environmental	Lead
M17	357M021	0 - 4	Soil	Environmental	Lead
	357M112	6 - 8	Soil	Environmental	Lead
	357M113	14 - 16	Soil	Environmental	Lead
M18	357M022	4 - 6	Soil	Environmental, MS/MSD	Lead
M19	357M023	4 - 6	Soil	Environmental	Lead
	357M024	4 - 6	Soil	Field Duplicate of #357M024	Lead
M20	357M025	4 - 6	Soil	Environmental	Lead
M21	357M026	4 - 6	Soil	Environmental	Lead
M22	357M027	4 - 6	Soil	Environmental	Lead
M23	357M028	4 - 6	Soil	Environmental	Lead
M24	357M029	4 - 6	Soil	Environmental	Lead
M25	357M030	4 - 6	Soil	Environmental	Lead
M26	357M031	4 - 6	Soil	Environmental	Lead
M27	357M032	5 - 7	Soil	Environmental	Lead
M28	357M033	5 - 7	Soil	Environmental	Lead
M29	357M035	4 - 6	Soil	Environmental	Lead
M30	357M036	4 - 6	Soil	Environmental	Lead
M31	357M037	4 - 6	Soil	Environmental	Lead
M32	357M038	5 - 7	Soil	Environmental, MS/MSD	Lead
M33	357M039	5 - 7	Soil	Environmental	Lead
	357M040	5 - 7	Soil	Field Duplicate of #357M039	Lead
M34	357M041	4 - 6	Soil	Environmental	Lead
M35	357M042	5 - 7	Soil	Environmental	Lead
M36	357M043	5 - 7	Soil	Environmental	Lead
M37	357M044	4 - 6	Soil	Environmental	Lead
M38	357M045	4 - 6	Soil	Environmental	Lead
M39	357M046	4 - 6	Soil	Environmental	Lead
M40	357M047	4 - 6	Soil	Environmental	Lead
M41	357M048	0 - 4	Soil	Environmental	Lead
M42	357M049	0 - 4	Soil	Environmental, MS/MSD	Lead

Table 2-13
Samples Collected at CAS 04-26-03, Lead Bricks
(Page 3 of 5)

Sample Location	Sample Number	Depth (in. bgs)	Matrix	Purpose	Analyses
M43	357M050	0 - 4	Soil	Environmental	Lead
	357M051	0 - 4	Soil	Field Duplicate of #357M050	Lead
M44	357M052	0 - 4	Soil	Environmental	Lead
M45	357M053	0 - 4	Soil	Environmental	Lead
M46	357M054	0 - 4	Soil	Environmental	Lead
M47	357M055	0 - 4	Soil	Environmental	Lead
M48	357M056	0 - 4	Soil	Environmental	Lead
M49	357M057	0 - 4	Soil	Environmental	Lead
M50	357M058	0 - 4	Soil	Environmental	Lead
M51	357M059	0 - 4	Soil	Environmental	Lead
M52	357M060	0 - 4	Soil	Environmental	Lead
M53	357M068	4 - 6	Soil	Environmental	Lead
M54	357M069	5 - 7	Soil	Environmental, MS/MSD	Lead
M55	357M070	4 - 6	Soil	Environmental	Lead
	357M071	4 - 6	Soil	Field Duplicate of #357M070	Lead
M56	357M072	4 - 6	Soil	Environmental	Lead
M57	357M073	5 - 7	Soil	Environmental	Lead
M58	357M074	6 - 8	Soil	Environmental	Lead
M59	357M075	6 - 8	Soil	Environmental	Lead
M60	357M076	5 - 7	Soil	Environmental	Lead
M61	357M077	5 - 7	Soil	Environmental	Lead
M62	357M078	4 - 6	Soil	Environmental	Lead
M63	357M079	5 - 7	Soil	Environmental	Lead
M64	357M080	4 - 6	Soil	Environmental	Lead
M65	357M081	6 - 8	Soil	Environmental	Lead
M66	357M082	5 - 7	Soil	Environmental	Lead
M67	357M083	6 - 8	Soil	Environmental	Lead
M68	357M084	5 - 7	Soil	Environmental, MS/MSD	Lead
M69	357M085	5 - 7	Soil	Environmental	Lead
M70	357M086	4 - 6	Soil	Environmental	Lead
	357M087	4 - 6	Soil	Field Duplicate of #357M086	Lead
M71	357M088	6 - 8	Soil	Environmental	Lead

Table 2-13
Samples Collected at CAS 04-26-03, Lead Bricks
(Page 4 of 5)

Sample Location	Sample Number	Depth (in. bgs)	Matrix	Purpose	Analyses
M72	357M089	4 - 6	Soil	Environmental	Lead
M73	357M090	5 - 7	Soil	Environmental	Lead
M74	357M091	6 - 8	Soil	Environmental	Lead
	357M106	14 - 16	Soil	Environmental	Lead
M75	357M092	5 - 7	Soil	Environmental	Lead
M76	357M093	6 - 8	Soil	Environmental	Lead
	357M107	14 - 16	Soil	Environmental	Lead
M77	357M094	6 - 8	Soil	Environmental	Lead
M78	357M095	6 - 8	Soil	Environmental	Lead
M79	357M096	6 - 8	Soil	Environmental	Lead
M80	357M097	5 - 7	Soil	Environmental	Lead
M81	357M098	5 - 7	Soil	Environmental	Lead
M82	357M099	6 - 8	Soil	Environmental	Lead
M83	357M100	5 - 7	Soil	Environmental	Lead
M84	357M114	0 - 4	Soil	Environmental	Lead
	357M115	6 - 8	Soil	Environmental	Lead
M85	357M116	0 - 4	Soil	Environmental	Lead
	357M117	6 - 8	Soil	Environmental	Lead
M86	357M118	0 - 4	Soil	Environmental	Lead
	357M119	6 - 8	Soil	Environmental	Lead
M87	357M120	0 - 4	Soil	Environmental	Lead
	357M121	8 - 10	Soil	Environmental	Lead
NA	357M301	NA	Water	Field Blank	Lead
NA	357M302	NA	Water	Equipment Rinsate Blank	Lead
NA	357M304	NA	Water	Trip Blank	Total VOCs
NA	357M305	NA	Water	Trip Blank	Total VOCs
NA	357M306	NA	Water	Trip Blank	Total VOCs
M09	357M501	0 - 4	Soil	WM	Set 2
M10	357M502	0 - 4	Soil	WM	Set 2
Drum 357M01	357M503	NA	Soil	WM	Set 2, TCLP Metals
Drum 357M02	357M504	NA	Soil	WM	Set 2, TCLP Metals
Drum 357M03	357M505	NA	Soil	WM	Set 2, TCLP Metals

Table 2-13
Samples Collected at CAS 04-26-03, Lead Bricks
(Page 5 of 5)

Sample Location	Sample Number	Depth (in. bgs)	Matrix	Purpose	Analyses
Drum 357M01	357M506	NA	Soil	WM	Set 3
Drum 357M02	357M507	NA	Soil	WM	Set 3
Drum 357M03	357M508	NA	Soil	WM	Set 3
Box 357M05	357M509	NA	Soil	WM	Set 2, Set 3, TCLP RCRA Metals
Box 357M07	357M510	NA	Soil	WM	Set 2, Set 3, TCLP RCRA Metals
Box 357M08	357M511	NA	Soil	WM	Set 2, Set 3, TCLP RCRA Metals
Box 357M08	357M512	NA	Soil	WM	Set 2, Set 3, TCLP RCRA Metals

Set 2 = Gamma Spectroscopy, Isotopic Uranium, Isotopic Plutonium, Strontium-90
Set 3 = Total VOCs, Total SVOCs, pH, Paint Filter Liquid Test, Reactive Sulfide, Reactive Cyanide

in. bgs = Inches below ground surface
MS/MSD = Matrix spike/matrix spike duplicate
NA = Not applicable
WM = Waste management

respectively. These soil samples were collected as composite samples at 4 locations approximately 2 ft into the center of each dirt mound.

No Decision II soil samples or waste management samples were collected at this CAS. A summary of the samples collected at CAS 25-15-01 is provided in [Table 2-14](#). [Figure 2-16](#) is the map showing sample locations with the corresponding soil sample identifications collected from each sample location.

2.2 Deviations from SAFER Plan as Approved

The following deviations were made from the SAFER Plan for CAU 357:

- The SAFER Plan for CAU 357 states that soil samples collected at all CASs, except CASs 01-99-01 and CAS 04-26-03, will be analyzed for TPH-gasoline-range organics (GRO) and for VOCs that include the gasoline constituents benzene, toluene, ethylbenzene, and total

**Table 2-14
Samples Collected at CAS 25-15-01, Waste Dump**

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	Analyses
N01	357N001	0.0 - 0.5	Native Soil	Environmental	Set 1
	357N002	17.0 - 18.0	Native Soil	Environmental	Set 1
N02	357N003	0.0 - 0.5	Native Soil	Environmental	Set 1
	357N004	14.0 - 15.0	Native Soil	Environmental	Set 1
N03	357N005	0.0 - 0.5	Native Soil	Environmental	Set 1
	357N006	19.0 - 20.0	Native Soil	Environmental	Set 1
N04	357N007	0.0 - 0.5	Native Soil	Environmental	Set 1
	357N008	1.5 - 2.0	Native Soil	Environmental	Set 1
N05	357N009	0.0 - 0.5	Native Soil	Environmental	Set 1
N06	357N010	0.0 - 0.5	Native Soil	Environmental	Set 1
N07	357N011	NA	Native Soil	Environmental	Set 1
	357N012	NA	Native Soil	Field Duplicate of #357N011	Set 1
N08	357N013	NA	Native Soil	Environmental	Set 1
N09	357N014	NA	Native Soil	Environmental	Set 1
N10	357N015	NA	Native Soil	Environmental	Set 1
NA	357N301	NA	Water	Trip Blank	Total VOCs
NA	357N302	NA	Water	Field Blank	Set 1
NA	357N303	NA	Water	Trip Blank	Total VOCs
NA	357N304	NA	Water	Source Blank	Set 1
NA	357N305	NA	Water	Equipment Rinsate Blank	Set 1
NA	357N306	NA	Water	Trip Blank	Total VOCs

Set 1 = Total VOCs, Total SVOCs, Total RCRA Metals, TPH-DRO, PCBs, Gamma Spectroscopy, Isotopic Uranium, Isotopic Plutonium, Strontium-90

ft bgs = Feet below ground surface

NA = Not applicable

xylenes. Soil samples were not analyzed for TPH-GRO as part of this investigation because of the VOC analysis that included the gasoline constituents.

- The SAFER Plan for CAU 357 states that the documentation required to register Building 1-31.2e1 at CAS 01-99-01 as a historical building will be completed. The building is currently part of the Apple-2 Historic District; therefore, no further documentation is required (DRI, 2000).

2.3 Corrective Action Schedule as Completed

Closure activities were completed as follows:

- Prefield activities (including geophysical and radiological surveys) - Radiological surveys were completed at select CASs as part of the preliminary assessment of CAU 357 completed in early 2002. The majority of the radiological surveys, the geophysical surveys, and prefield activities were initiated in early April 2004 and completed by August 13, 2004.
- Decision I and II sampling activities - Conducted from August 16, 2004, to January 5, 2005.
- Excavation at CAS 08-09-01 - Conducted on September 9, November 3, and November 30, 2004; Excavation at CAS 07-09-03 - Conducted on January 5, 2005.
- Lead brick removal and verification sampling - Conducted on August 17 to August 19, 2004; October 18 to November 5, 2004; and December 2, 2004.

2.4 Site Plans/Survey Plat

Site plans are provided in [Figure 2-1](#) through [Figure 2-16](#) showing corresponding sample locations at each CAS.

3.0 Waste Disposition

Investigation-derived waste (IDW) was generated during the field activities at CAU 357. The waste streams were decontamination rinsate, sanitary waste, hydrocarbon solids, low-level radioactive waste, and mixed waste solids. The types, amounts, and disposal of the wastes are detailed in the following subsections. Site controls were in place to prevent the introduction of hazardous constituents to these waste streams.

3.1 Waste Minimization

Corrective Action Unit 357 integrated waste minimization into the field activities. The IDW was segregated to the greatest extent possible. No hazardous materials were used during the investigation and the generation of hazardous and/or mixed waste was minimized. Decontamination activities were planned and executed to minimize the volume of rinsate generated.

3.2 Characterization

Analytical results obtained from waste characterization samples or associated environmental samples were reviewed against federal regulations; state regulations; DOE directives, policies, and guidance; waste disposal criteria; and standard quality practices.

- The IDW generated by site closure activities at CAU 357 is a solid waste according to Title 40 *Code of Federal Regulations* (CFR) Part 261.2 (CFR, 2003a).
- 40 CFR 261.3(a)(2)(iv), 261.4 and 261.6(a)(3) were reviewed to determine if the waste was excluded from regulation as a solid waste or hazardous waste. The waste is not excluded from regulation as a solid or hazardous waste (CFR, 2003a).
- Analytical results and knowledge of the waste were used to determine if the waste met criteria as a hazardous waste in Subpart C “Characteristics of Hazardous Waste,” as per 40 CFR 261.24. The soil and lead brick waste generated at CAS 04-26-03 were assigned the EPA Waste Code D008 for lead contamination (CFR, 2003a).
- The F-coded wastes discussed in 40 CFR 261.31, “Hazardous Wastes From Non-Specific Sources,” are not applicable to these sites (CFR, 2003a).
- The K-codes as discussed in 40 CFR 261.32, “Hazardous Wastes From Specific Sources,” are not applicable to these sites (CFR, 2003a).

- The P- and U-codes as discussed in 40 CFR 261.33, “Discarded Commercial Chemical Products, Off-Specification Species, Container Residues, and Spill Residues Thereof,” are not applicable to these sites (CFR, 2003a).
- The *Toxic Substances Control Act* (TSCA) regulation, which governs the storage and disposal of polychlorinated biphenyl (PCB) waste, is not applicable to these sites as PCB analytical results were not above 50 mg/kg as defined in 40 CFR 761.3 (CFR, 2003b).
- Based on analytical results, mixed waste was generated at CAS 04-26-03. Waste mixtures (e.g., lead waste that contains radioactivity) were managed in compliance with the applicable regulations of *Resource Conservation and Recovery Act* (RCRA) and agreements between NNSA/NSO and the State of Nevada, as well as DOE requirements for radioactive waste.
- The State of Nevada has set a regulatory action limit for hydrocarbon-impacted soil waste of 100 mg/kg. The TPH-DRO analytical results for each sample were compared to the regulatory limit. Hydrocarbon soil waste was generated at CAS 08-09-01.
- Analytical results and knowledge of the waste were used to determine if waste exceeded the criteria for radioactive waste as listed in Table 4-2 of the *NV/YMP Radiological Control Manual* (DOE/NV, 2000), Section C of the *NTS Performance Objective for Certification* (BN, 1995), and the Area 23 Solid Waste Landfill Permit, Area 6 Hydrocarbon Landfill Permit, and U10e Crater Permit values. Soil and lead brick waste generated at CAS 04-26-03 is mixed (hazardous and radioactive) waste. The soil waste generated at CAS 07-09-03 is considered low-level radioactive waste.

3.3 Waste Streams

The IDW generated by site closure activities at CAU 357 were segregated into the following waste streams:

- Sanitary waste including, but was not limited to: personal protective equipment (PPE), disposable sampling equipment, plastic sheeting, glass/plastic sample jars, aluminum foil, and other debris collected during housekeeping activities such as metal cables, tarps, hoses, fiberglass piping, wood, boxes, and empty drums
- Decontamination rinsate
- Hydrocarbon solids (e.g., soil)
- Radioactive solids (e.g., soil)
- Mixed waste solids (e.g., soil and lead bricks)

3.4 Waste Sampling

Waste determinations were made using process knowledge and media sample association. Direct sampling was performed to confirm the regulatory status of IDW. Soil samples were collected specifically for waste characterization at CASs 08-09-01, 08-09-03, 10-09-02, and 04-26-03. The analytical results of these samples are summarized on [Table E.1-1](#), [Table E.1-2](#), [Table E.1-3](#), and [Table E.1-4](#) provided in [Appendix E](#).

3.5 Storage

The IDW generated was managed within six hazardous waste accumulation areas (HWAAs), six satellite accumulation areas (SAAs), and two controlled areas. All potentially hazardous and/or radioactive materials that were stored in 55-gallon U.S. Department of Transportation (DOT) specification steel drums were labeled as “Hazardous Waste - Pending Analysis” and/or “Radiological Waste - Pending Analysis.” All potentially radioactive and mixed waste materials were placed in DOT-approved B25 boxes and labeled as “Radiological Waste - Pending Analysis.” The amount, type, and source of waste placed into each waste container was recorded in waste management logbook for each CAS. All waste is traceable to associated sample media. Waste accumulation areas were inspected regularly as required by federal regulation and internal procedures (CFR, 2003a).

3.6 Waste Disposal

A total of 37 drums, five B25 boxes, and three roll-off boxes of IDW were generated during the investigation. The following paragraphs summarize the types and amounts of waste generated and disposed during the CAU 357 investigation:

- All PPE and disposable sampling equipment generated during site closure activities was determined to be sanitary based on observations and process knowledge. The waste was bagged, labeled, and placed in a roll-off box for disposal in the Area 9 U10c Landfill.
- Eleven drums of decontamination rinsate were generated and characterized as sanitary waste. Pickup and disposal request for this waste stream is intended for the Area 23 Sanitary Lagoon.

- Five B25 boxes and three 55-gallon drums generated at CAS 04-26-03 were characterized as mixed (lead and radioactive) waste. Pickup and disposal request for this waste stream is intended for the Envirocare Treatment, Storage, and Disposal Facility (TSDF) in Utah.
- The 22 drums of soil generated at CAS 08-09-01 were characterized as hydrocarbon waste. Pickup and disposal request for this waste stream is intended for the Area 6 Hydrocarbon Landfill.
- One 55-gallon drum of soil generated at CAS 07-09-03 was characterized as low-level radioactive waste. Pickup and disposal request for this waste stream is intended for the Area 5 Radioactive Management Site Facility (RMSF).
- Two roll-off boxes containing housekeeping/waste debris were generated and determined to be sanitary based on observations and process knowledge. Pickup and disposal request for this waste stream is intended for the Area 9 U10c Landfill.

4.0 Closure Verification Results

This section summarizes the soil sample analytical results, remediation/soil excavation activities, and risk-based results obtained during the CAU 357 closure activities. Excavation activities were performed and verification samples were collected at CASs 07-09-03, 08-09-01, and 04-26-03. The risk-based FAL was calculated for lead at CAS 04-26-03 using the EPA Adult Lead Methodology (EPA, 2003) due to the detection of lead in surface soil within the “high-density area” at concentrations that exceeded the PAL. Concentrations of radionuclides were also detected in soil samples collected at CAS 08-09-03, 10-09-02, and 10-09-06 that exceeded the screening PALs. To evaluate the risk of these radionuclides the site-specific inputs were entered in the RESRAD computer code (version 6.22) to calculate the residual radioactive material guidelines or FALs for the site-specific radionuclides. The methods used to calculate the risk-based FALs are provided in [Appendix I](#).

CAS 07-09-02: Analytical results obtained from Decision I soil samples indicate concentrations of metals, gamma-emitting radionuclides, and isotopes above the laboratory method detection limits (MDLs). These concentrations were below the respective FALs. The analytical results are summarized in [Table D.1-1](#) through [Table D.1-3](#) provided in [Appendix D](#). The analytical data supports no further action at this CAS.

CAS 07-09-03: Analytical results obtained from Decision I soil samples and step-out samples indicate concentrations of VOCs, TPH-DRO, metals, gamma-emitting radionuclides, and isotopes above the laboratory MDLs. These concentrations were below the respective FALs, except for the Pu-239 detected in soil sample 357B015 collected at location B07. This soil sample was collected at a surface location and was from native soil not associated with the drilling mud within the mud pit. The Pu-239 was likely present at this location due to fallout from atmospheric testing at the NTS; therefore, it is not a COC at this CAS. As a best management practice and to mitigate potential personnel exposure, the impacted soil at location B07 was excavated and verification soil samples were collected. The excavated area was approximately 3- by 3-ft and extended to a depth of approximately 1 ft bgs. The impacted soil (less than 1 cubic yard) was contained in one 55-gallon drum. The analytical results obtained from the verification samples indicated no detections above the

FALs. The analytical results are summarized in [Table D.1-4](#) through [Table D.1-8](#) provided in [Appendix D](#).

CAS 07-09-04: Analytical results obtained from Decision I soil samples indicate concentrations of metals, gamma-emitting radionuclides, and isotopes above the laboratory MDLs. These concentrations were below the respective FALs. The analytical results are summarized in [Table D.1-9](#) through [Table D.1-11](#) provided in [Appendix D](#). The analytical data supports the closure alternative of no further action at this CAS.

CAS 07-09-05: Analytical results obtained from Decision I soil samples indicate concentrations of VOCs, metals, gamma-emitting radionuclides, and isotopes above the laboratory MDLs. These concentrations were below the respective FALs. The analytical results are summarized in [Table D.1-12](#) through [Table D.1-15](#) provided in [Appendix D](#). The analytical data supports the closure alternative of no further action at this CAS.

CAS 08-09-01: Analytical results obtained from Decision I soil samples indicate concentrations of VOCs, TPH DRO, metals, gamma-emitting radionuclides, and isotopes above the laboratory MDLs. These concentrations were below the respective FALs, except for the TPH-DRO detected in soil samples 357E006, 357E007, and 357E008 collected at location E04. The concentration of TPH-DRO detected in these samples were 6,200 mg/kg; 1,100 mg/kg; and 940 mg/kg, respectively. This is above the FAL for TPH DRO of 100 mg/kg. The analytical results are summarized in [Table D.1-16](#) through [Table D.1-20](#) provided in [Appendix D](#).

A total of 15 Decision II soil samples were collected to assess the extent of TPH-DRO that resulted from leaking oil filters at location E04. The soil around location E04 was excavated and contained in 22 55-gallon drums. The excavated area was approximately 5- by 6-ft and extended to a depth of approximately 8 ft bgs. Decision II soil samples were collected using a backhoe. The verification samples 357E020 collected at 5.5 to 6.0 ft bgs and 357E021 collected at 8.0 to 8.5 ft bgs defined the vertical extent of TPH-DRO at location E04. The soil sample analytical results obtained from these samples indicated no detections of TPH-DRO above the FAL. The verification samples 357E010/357E011, 357E022, 357E013, and 357E018 were collected to define the lateral extent of TPH-DRO at locations E05, E06, E07, and E08, respectively. The soil analytical results obtained from these samples indicated no detections of TPH-DRO above the FAL. The excavation/removal of

soil and verification sample analytical results supports the closure alternative of clean closure of this CAS.

CAS 08-09-02: Analytical results obtained from Decision I soil samples indicate concentrations of metals, gamma-emitting radionuclides, and isotopes above the laboratory MDLs. These concentrations were below the respective FALs. The analytical results are summarized in [Table D.1-21](#) through [Table D.1-23](#) provided in [Appendix D](#). The analytical data supports the closure alternative of no further action at this CAS.

CAS 08-09-03: Analytical results obtained from Decision I soil samples indicate concentrations of metals, gamma-emitting radionuclides, and isotopes above the laboratory MDLs. The analytical results obtained from the four surface soil samples collected at locations G01 through G04 indicated concentrations of cesium (Cs)-137 above the screening PAL of 7.3 picocuries per gram (pCi/g). The concentrations of Cs-137 detected in these samples ranged from 8.3 to 37.1 pCi/g. All other sample analytical results indicated no detections of COPCs above the respective screening PALs. The analytical results are summarized in [Table D.1-24](#) through [Table D.1-26](#) provided in [Appendix D](#).

The Cs-137 is contained at the surface of these mud pits and does not extend vertically to native soil. This contamination is likely the result of radioactive fallout from venting during the Baneberry Test and not associated with the drilling process. The radiological survey conducted at this CAS confirmed the presence of high radiological background concentrations in the soil surrounding the mud pits. The mud pit is located approximately 80 ft from the center of the U-8d crater that is currently listed as a contamination area.

To determine if the Cs-137 posed an unacceptable risk to human health and the environment site-specific data were evaluated using the RESRAD code to calculate the maximum dose rate per year to an individual on site and to determine the residual radioactive material guidelines or risk-based FALs. The risk-based evaluation established the FAL for Cs-137 to be 232 pCi/g. The maximum dose was established at 2.24 mrem/yr which is below the NTS dose constraint of 25 mrem/yr. The RESRAD calculations were based on a low-occupancy industrial land-use scenario. The concentrations of Cs-137 detected in soil samples at this CAS do not exceed the FAL. This supports the closure alternative of no further action at this CAS. The method used to calculate the risk-based FALs are provided in [Appendix I](#).

CAS 10-09-02: Analytical results obtained from Decision I soil samples indicate concentrations of TPH-DRO, PCBs, semivolatile organic compounds (SVOCs), metals, gamma-emitting radionuclides, and isotopes above the laboratory MDLs. The analytical results of soil samples collected from within Mud Pit A at locations H01, H02, and H03 indicated no detections above the screening PALs. The analytical results of soil samples collected from locations H04, H05, and H06 indicated concentrations of Cs-137 and isotopic Pu-239 above their respective screening PALs. The concentrations of Cs-137 ranged from 8.5 to 19.4 pCi/g and the concentrations of Pu-239 range from 8.2 to 25 pCi/g. The analytical data indicated that all other COPCs at these locations do not exceed their respective screening PALs. The analytical results are summarized in [Table D.1-27](#) through [Table D.1-32](#) provided in [Appendix D](#).

The soil samples collected from locations H04, H05, and H06 were collected from native soil and/or native soil mixed with drilling mud. Soil sample analytical results obtained from soil samples at these locations indicated concentrations of Cs-137 and Pu-239 above their respective screening PALs. The radiological survey conducted at this CAS indicated high radiological background concentrations in soil surrounding the mud pits. The high radiological concentrations are the result of the mud pits proximity to the potential crater U-10as and Sedan Crater.

To determine if the Cs-137 and Pu-239 posed an unacceptable risk to human health and the environment, site-specific data were evaluated using the RESRAD code to calculate the maximum dose rate per year to an individual on site and to determine the risk-based FALs. The risk-based evaluation established the FAL for Cs-137 to be 218 pCi/g and the FAL for Pu-239 to be 1,714 pCi/g. The maximum dose was established at 1.4 mrem/yr, which is below the NTS dose constraint of 25 mrem/yr. The RESRAD calculations were based on a low-occupancy industrial land-use scenario. The concentrations of Cs-137 and Pu-239 detected in soil samples at this CAS do not exceed the FAL. The analytical data supports the closure alternative of no further action at this CAS. The method used to calculate the FALs are provided in [Appendix I](#).

CAS 10-09-04: Analytical results obtained from Decision I soil samples indicate concentrations of VOCs, metals, gamma-emitting radionuclides, and isotopes above the laboratory MDLs. These concentrations were below the respective FALs. The analytical results are summarized in

[Table D.1-33](#) through [Table D.1-36](#) provided in [Appendix D](#). The analytical data supports the closure alternative of no further action at this CAS.

CAS 10-09-05: Analytical results obtained from Decision I soil samples indicate concentrations of VOCs, metals, gamma-emitting radionuclides, and isotopes above the laboratory MDLs. These concentrations were below the respective FALs. The analytical results are summarized in [Table D.1-37](#) through [Table D.1-40](#) provided in [Appendix D](#). The analytical data supports the closure alternative of no further action at this CAS.

CAS 10-09-06: Analytical results obtained from Decision I soil samples indicate concentrations of VOCs, TPH-DRO, PCBs, metals, gamma-emitting radionuclides, and isotopes above the laboratory MDLs. These concentrations were below the respective screening PALs, except for the Co-60 detected in surface soil samples collected at locations K02 and K03. The concentrations of Co-60 detected in these samples were 4.12 pCi/g and 5.33 pCi/g. These are above the screening PAL for Co-60 of 1.61 pCi/g. The analytical results are summarized in [Table D.1-41](#) through [Table D.1-46](#) provided in [Appendix D](#).

Two Decision II soil samples (357K005 and 357K006) were collected to assess the extent of Co-60 within the mud pit. The analytical results obtained from the surface sample 357K005 indicated a concentration of Co-60 of 140 pCi/g. Soil sample 357K006 was collected to define the vertical extent of Co-60 within the mud pit. The analytical results obtained from the deeper sample indicated a concentration of Co-60 of 2.41 pCi/g, which is above the screening PAL of 1.61 pCi/g. The analytical results and sample locations appear to correlate to an area of cement grout on the surface of mud pit. [Figure 4-1](#) is the map showing sample locations with corresponding sample analytical results.

To determine if the Co-60 posed an unacceptable risk to human health and the environment, site-specific data were evaluated using RESRAD code to calculate the maximum dose rate per year to an individual on site and to determine the FAL. The evaluation established the FAL for Co-60 to be 48 pCi/g. The maximum dose was established at 50 mrem/yr, which is above the NTS dose constraint of 25 mrem/yr. The RESRAD calculations were based on a low-occupancy industrial land-use scenario. The concentration of Co-60 detected in the surface soil sample 357K005 collected at location K04 exceeds the FAL. These results support the closure alternative of close in place at this

Figure 4-1
CAU 357, CAS 10-09-06, Mud Pit; Stains; Materials

CAS. The implementation of a use restriction is discussed further in [Section 4.2](#). The method used to calculate the FALs are provided in [Appendix I](#).

CAS 01-99-01: Analytical results obtained from Decision I samples indicate concentrations of gamma-emitting radionuclides and isotopes above the laboratory MDLs. These concentrations were below the respective FALs. The results of the radiological survey and swipe sample results indicated no radiological activity or removable contamination was present in Building 1-31.2e1. The soil sample analytical results are summarized in [Table D.1-47](#) and [Table D.1-48](#) provided in [Appendix D](#). The analytical data supports the closure alternative of no further action at this CAS.

CAS 04-26-03: Analytical results obtained from Decision I samples indicate concentrations of lead above the laboratory MDL. These concentrations of lead were above the initial screening PAL of 750 mg/kg in soil samples collected at 17 sample locations. The concentrations of lead ranged from 950 to 19,000 mg/kg. Six of the 17 sample locations were surface locations within the “high-density area” and not associated with specific lead bricks/debris. The analytical data at these locations suggests that lead contamination in the “high-density area” is not limited to directly below lead bricks/debris. The analytical results are summarized in [Table D.1-49](#) provided in [Appendix D](#).

A total of 30 Decision II soil samples (including duplicates) were collected to assess the extent of lead at the 17 locations. The lead contaminated soil at these locations was excavated using shovels and verification soil samples were collected. The excavations varied in depth from 8 to 24 in. bgs. The analytical results obtained from the verification samples defined the vertical extent of lead at all sample locations, except locations M15 and M86. The analytical results obtained from verification soil sample 357M110 collected at location M15 indicated a concentration of lead of 4,300 mg/kg at the sample interval 14 to 16 in. bgs. The analytical results obtained from soil sample 357M119 collected at location M86 indicated a concentration of lead of 3,100 mg/kg at the sample interval 6 to 8 in. bgs. These concentrations of lead are above the screening PAL for lead of 750 mg/kg that is based on the EPA Region 9 PRGs established in 2002. The more current PRG for lead established in October 2004 is 800 mg/kg. The current PRG was not used because the SAFER Plan stipulated the use of the 2002 PRGs. The samples that detected concentrations above the screening PALs are located within the “high-density area.”

To determine an estimate of the concentrations of lead in soil at the surface of the “high-density area” a statistical analysis of the data was performed. A Shapiro-Wilk Test was performed to determine the

distribution of the data set and a 95 percent UCL of the arithmetic mean was calculated. The UCL for lead was calculated at 14,600 mg/kg. This is an estimate of the average concentration of lead in surface soil within the “high-density area.” The results of the Shapiro-Wilk statistical analysis are provided in the closure recommendation in [Appendix J](#).

To determine the risk the lead poses to human health and the environment and to establish the risk-based FAL an adult lead model was used. The risk-based calculation established the FAL for lead to be 17,079 mg/kg. The FAL was based on a low-occupancy industrial land-use scenario. The analytical results indicate that remaining lead concentrations do not exceed the FAL. A use restriction is recommended as a best management practice to ensure access to the “high-density area” does not exceed the 10 days/year assumption used in the calculation of the FAL. The results of the risk-based evaluation are provided in the closure recommendation in [Appendix J](#). [Figure 4-2](#) is the map showing sample locations with verification sample results.

CAS 25-15-01: Analytical results obtained from Decision I samples indicate concentrations of metals, gamma-emitting radionuclides, and isotopes above the laboratory MDLs. These concentrations were below the respective FALs. The analytical results are summarized in [Table D.1-50](#) through [Table D.1-52](#) provided in [Appendix D](#). The analytical data supports the closure alternative of no further action at this CAS.

4.1 Data Quality Assessment

As required by Section 5.5 of the Industrial Sites QAPP (NNSA/NV, 2002), a DQA was performed to verify DQO assumptions and document performance of the DQO tests listed in Appendix A of the CAU 357 SAFER Plan. This assessment was performed following the EPA *Guidance for Data Quality Assessments: Practical Methods for Data Analysis* (EPA, 2000b) document referenced in Section 5.5 of the Industrial Sites QAPP (NNSA/NV, 2002). This use of the DQA process has been applied to a DQO process based on judgmental sampling. A discussion on the applicability of judgmental sampling to the CAU 357 DQO process is provided in [Section 2.0](#).

The DQA process is the evaluation of the actual investigation results to determine if the DQO criteria established in the CAU 357 SAFER Plan were met and if DQO decisions can be resolved at the desired level of confidence. The DQO process ensures that the right type, quality, and quantity of data will be available to support the resolution of those decisions at an appropriate level of

Figure 4-2

CAU 357
 CAS 04-26-03
 Remaining Lead
 Concentrations

confidence. Using both the DQO and DQA processes help to ensure that DQO decisions are sound and defensible.

The DQA involves five steps that begin with a review of the DQOs and end with an answer to the DQO decisions. The five steps are briefly summarized as follows:

Step 1: Review DQOs and Sampling Design - Review the DQO process to provide context for analyzing the data. State the primary statistical hypotheses, confirm the limits on decision errors for committing false rejection (Type I) or false acceptance (Type II) decision errors, and review any special features, potential problems, or any deviations to the sampling design.

Step 2: Conduct Preliminary Data Review - A preliminary data review should be performed by reviewing quality assurance (QA) reports and inspecting the data both numerically and graphically, validate and verify the data to ensure that the measurement systems performed in accordance with the criteria specified, and use the validated dataset to determine if the quality of the data is satisfactory.

Step 3: Select the Test - Select the test based on the population of interest, population parameter, and the hypotheses. Identify the key underlying assumptions that could cause a change in one of the DQO decisions.

Step 4: Verify the Assumptions - Perform tests of assumptions. If data are missing or are censored, determine the impact on DQO decision error.

Step 5: Draw Conclusions from the Data - Perform the calculations required for the test.

4.1.1 Review DQOs and Sampling Design

This section contains a review of the DQO process presented in Appendix A of the CAU 357 SAFER Plan (NNSA/NSO, 2003b). The DQO decisions are presented with the DQO provisions to limit false rejection (false negative) or false acceptance (false positive) decision errors. Special features, potential problems, or any deviations to the sampling design are also presented.

Two DQO decisions are presented in the CAU 357 SAFER Plan:

- Decision I - “Is contamination present within CAU 357 at concentrations that could pose an unacceptable risk to human health and the environment?”
- Decision II - “If a COC is present, is the information available sufficient to evaluate appropriate closure?”

4.1.1.1 Decision I

Decision Rules:

- If the concentration of any COPC in a target population exceeds the PAL for that COPC during the initial investigation, then that COPC is identified as a COC and Decision II sampling will be conducted to determine the extent of contamination.
- If COC concentrations are less than the corresponding FAL, then the decision will be no further action.

4.1.1.1.1 DQO Provisions to Limit False Negative Decision Error

A false rejection decision error (where consequences are more severe) was controlled by meeting the following criteria:

1. Having a high degree of confidence that locations selected will identify COCs if present anywhere within the CAS.
2. Having a high degree of confidence that analyses conducted will be sufficient to detect any COCs present in the samples.
3. Having a high degree of confidence that the dataset is of sufficient quality and completeness.

Criterion 1:

Sample locations were selected based on the following:

1. Selection of sample locations based on radiological walk-over survey results was accomplished at all CASs by plotting radiological survey results and reviewing data to identify areas having contamination in surface soils that is statistically greater than surface soil at undisturbed background locations.
2. Selection of sample locations based on geophysical survey results was accomplished at all CASs by plotting geophysical survey results and reviewing data to determine the

configuration of the waste dump/mud pits/lead brick scatter area and to identify potentially buried debris/lead bricks.

3. Selection of sample locations based on field screening results was accomplished at all CAS by analyzing select samples for TPH-DRO using a gas chromatograph, VOCs using a flame-ionization detector (FID), alpha and beta/gamma-emitting radionuclides using a handheld NE Technology Electra, and gamma-emitting radionuclides using gamma spectroscopy.
4. Selection of sample locations based on visual observations of staining, lead brick cluster patterns, "Building 1-31.2e1" doors and windows, or debris that may have resulted in the release of a potentially hazardous substance was accomplished at all CASs by walking the site and identifying debris/lead bricks or areas of staining prior to initiating sampling activities.
5. Selection of surface sample locations based on the absence of lead bricks/debris was accomplished at CAS 04-26-03 by identifying surface locations between lead bricks/debris. These sample locations were identified to determine the presence and/or absence of lead not directly associated with lead bricks/debris.
6. Selection of sample locations using a nonparametric random sampling approach was accomplished at CAS 07-09-03 by using the Wilcoxon Signed Ranks test to calculate the number of samples and identify the random sample locations.
7. Selection of sample locations at the mud pit CASs was accomplished by identifying the following areas within the mud pits:
  - A: Surface locations at the influent (pipe outfalls) or topographic high within the mud pit
  - B: Surface locations where ponding occurred or at the topographic low within the mud pit
8. Selection of sample locations associated with professional judgment at all CASs was based on acceptable knowledge and accomplished by:
  - Source and location of release
  - Chemical nature and fate properties
  - Physical transport pathways and properties
  - Transport drivers

Table 4-1 provides the justification for the selection of Decision I sample locations.

Criterion 2:

Samples were analyzed using the analytical methods listed in Table 6-2 of the SAFER Plan and for the chemical and radiological parameters listed in Section A.1.4 of the SAFER Plan

Table 4-1
Decision I Sample Location Justification for CAU 357
(Page 1 of 2)

CAS	Sample Location	Notes
07-09-02	A01	Topographic high
	A02	Biased location selected based on grayish grout on surface
	A03	Topographic low
07-09-03	B01	Random sample location
	B02	Random sample location and topographic low Mud Pit B
	B03, B04	Random sample location
	B05	Random sample location and topographic high Mud Pit B
	B06	Random sample location and topographic low Mud Pit A
	B07 through B13	Random sample location
	B14	Random sample location and topographic high Mud Pit A
	B15	Random sample location
07-09-04	C01	Topographic high
	C02	Biased sample location
	C03	Topographic low
	C04, C05	Pipe outfall
07-09-05	D01	Topographic high
	D02	Geophysical survey results
	D03	Topographic low
08-09-01	E01	Topographic high
	E02	Topographic low
	E03, E09	Biased location below empty 55-gallon drum
	E04	Biased location below oil filters with surface staining
08-09-02	F01	Topographic low
	F02	Based on geophysical survey results
	F03	Topographic high
08-09-03	G01	Topographic high Mud Pit A
	G02	Topographic low Mud Pit A
	G03	Topographic low Mud Pit B
	G04	Topographic high Mud Pit B

Table 4-1
Decision I Sample Location Justification for CAU 357
(Page 2 of 2)

CAS	Sample Location	Notes
10-09-02	H01	Topographic low Mud Pit A
	H02	Biased sample location
	H03	Topographic high Mud Pit A
	H04	Topographic low Mud Pit B
	H05	Pipe outfall
	H06	Topographic high Mud Pit B
10-09-04	I01	Topographic high
	I02	Topographic low
	I03	Biased grayish grout on surface
10-09-05	J01	Topographic low
	J02	Topographic high
10-09-06	K01	Topographic high
	K02	Topographic low
	K03	Radiological survey results & staining
	K04	Radiological survey results
01-99-01	L01	Outside building door way
	L02	Below building window
CAS 04-26-03	M01 through M14	Sample location below former lead bricks/debris
	M15, M16, & M17	Sample locations not associated with lead bricks/debris
	M18 through M40	Sample locations below former lead bricks/debris
	M41 through M52	Sample locations not associated with lead bricks/debris
	M53 through M83	Sample locations below former lead bricks/debris
	M84 through M87	Sample locations not associated with lead bricks/debris
25-15-01	N01 through N04	Geophysical survey results investigating perimeter of waste dump
	N05, N06	Biased locations at surface of excavated area of waste dump
	N07 through N10	Composite sample of dirt mound #1

(NNSA/NSO, 2003b), with the exception of TPH-GRO. Corrective action sites that required the analysis of TPH-GRO were analyzed for total VOCs that includes the gasoline constituents benzene, toluene, ethylbenzene and total xylenes. These data satisfy the requirement for determining the presence and/or absence of gasoline range organics. [Table 4-2](#) provides a reconciliation of samples analyzed to the planned analytical program.

Table 4-2
CAU 357 Number of Samples Submitted per Analyte

CAS	ANALYTICAL METHODS											
	Total VOCs	Total SVOCs	PCBs	Metals	TPH-DRO	TPH-GRO	TCLP Metals	TCLP Mercury	Gamma Spectroscopy	Isotopic Uranium	Isotopic Plutonium	Strontium-90
07-09-02	X	X	X	X	X	NA	NA	NA	X	X	X	X
07-09-03	X	X	X	X	X	NA	NA	NA	X	X	X	X
07-09-04	X	X	X	X	X	NA	NA	NA	X	X	X	X
07-09-05	X	X	X	X	X	NA	NA	NA	X	X	X	X
08-09-01	X	X	X	X	X	NA	X	NA	X	X	X	X
08-09-02	X	X	X	X	X	NA	NA	NA	X	X	X	X
08-09-03	X	X	X	X	X	NA	NA	NA	X	X	X	X
10-09-02	X	X	X	X	X	NA	NA	NA	X	X	X	X
10-09-04	X	X	X	X	X	NA	NA	NA	X	X	X	X
10-09-05	X	X	X	X	X	NA	NA	NA	X	X	X	X
10-09-06	X	X	X	X	X	NA	NA	NA	X	X	X	X
01-99-01	NA	NA	NA	NA	NA	NA	NA	NA	X	X	X	X
04-26-03	X	X	NA	X	NA	NA	X	X	X	X	X	X
25-15-01	X	X	X	X	X	NA	NA	NA	X	X	X	X

NA = Not analyzed

Metals Analysis Included: antimony, arsenic, barium, beryllium, cobalt, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, vanadium, and zinc.

Sample results were assessed against the DQI of sensitivity as defined in the Industrial Sites QAPP (NNSA/NV, 2002). The sensitivity goal defined in the SAFER Plan is that analytical detection limits will be less than the corresponding action level. This goal was not achieved for the analytical results

listed in [Table 4-3](#) and [Table 4-4](#). Results not meeting the sensitivity goal were not used in making DQO decisions; therefore, will be considered as rejected data. The impact on DQO decisions is addressed in the assessment of completeness.

Table 4-3
Chemical Analytes Failing Sensitivity Criteria (µg/kg)

Sample Number	Parameter	Result	Reporting Limit	Industrial 2002 (PRG)
357E005RR1RE	N-Nitrosodimethylamine	1,400	1,400	33.8
357E006	N-Nitrosodimethylamine	1,800	1,800	33.8
357E007	N-Nitrosodimethylamine	1,700	1,700	33.8
357E007RR1RE	Bis(2-Chloroethyl)Ether	17,000	17,000	553.9
357E007RR1RE	Hexachlorobenzene	17,000	17,000	1077.3
357E007RR1RE	Benzo(a)Pyrene	17,000	17,000	211
357E007RR1RE	Dibenzo(a,h)Anthracene	17,000	17,000	211
357E007RR1RE	N-Nitroso-Di-N-Propylamine	17,000	17,000	246.2
357E007RR1RE	Pentachlorophenol	35,000	35,000	8998.2
357G501	N-Nitrosodimethylamine	1,700	1,700	33.8
357H001	N-Nitrosodimethylamine	1,700	1,700	33.8
357H002	N-Nitrosodimethylamine	1,800	1,800	33.8
357H004	N-Nitrosodimethylamine	1,700	1,700	33.8
357H005	N-Nitrosodimethylamine	2,100	2,100	33.8
357H007	N-Nitrosodimethylamine	1,800	1,800	33.8
357H008	N-Nitrosodimethylamine	1,800	1,800	33.8
357H009	N-Nitrosodimethylamine	2,000	2,000	33.8
357M506RR1	N-Nitrosodimethylamine	180	180	33.8
357M507RR1	N-Nitrosodimethylamine	180	180	33.8
357M508RR1	Dibenzo(a,h)Anthracene	2,100	2,100	211
357M508RR1	N-Nitrosodimethylamine	350	350	33.8
357M509RR1	N-Nitrosodimethylamine	190	190	33.8
357M510RR1	N-Nitrosodimethylamine	180	180	33.8

Table 4-4
Radiological Analytes Failing Sensitivity Criteria

Sample Number	Parameter	Result	Units	Detect Limit	PAL
357K006DUP	Americium-241	-0.19	PCI/G	1.38	7.62
357K005	Uranium-235	-0.15	PCI/G	1.99	10.5
357K006	Americium-241	-0.6	PCI/G	4.8	7.62
357K005	Europium-154	-1.3	PCI/G	7.7	3.24
357K006DUP	Uranium-235	-0.34	PCI/G	1.02	10.5
357K006	Uranium-235	0.43	PCI/G	1.18	10.5
357K005	Americium-241	0.07	PCI/G	0.59	7.62
357J303	Americium-241	-60	pCi/L	210	7.6
357M504	Americium-241	10	pCi/g	10	7.6
357M504	Europium-154	7.1	pCi/g	3.9	3.24

Criterion 3:

To satisfy the third criterion, the entire dataset, as well as individual sample results, were assessed against the DQIs of precision, accuracy, comparability, completeness, and representativeness, as defined in the Industrial Sites QAPP (NNSA/NV, 2002). The DQI goals were presented in Table 6-1 of the SAFER Plan. These goals were met for each of the DQIs.

Precision

Precision is a measure of agreement among a replicate set of measurements of the same property under similar conditions. This agreement is expressed as the relative percent difference (RPD) between duplicate measurements (EPA, 1996). For the purpose of determining data precision of sample analyses, all water and soil samples, including field QC samples (i.e., trip blanks, equipment rinsate samples, field blanks, etc.) were evaluated and incorporated into the precision calculation. The duplicate precision is evaluated using the RPD or normalized difference. The RPD is applicable when both the sample and its duplicate have concentrations of the target radionuclide exceeding five times their minimum detectable concentration. This excludes many measurements because the samples contain nondetectable or low levels of the target radionuclide. In situations where the RPD does not apply, duplicate results are evaluated using the normalized difference (ND). [Table 4-5](#)

provides the chemical precision analysis results. [Table 4-6](#) provides the radiological precision analysis results.

Table 4-5
Chemical Precision Measurements for CAU 357

Measurements	ORGANICS				INORGANICS	
	VOCs	SVOCs	TPH (DRO)	PCBs	Metals*	Mercury
Matrix Spike Duplicate (MSD) Precision						
MSD	70	121	13	18	149	10
RPDs Within Criteria	70	121	13	18	149	10
MSD Percent Precision	100	100	100	100	100	100
Laboratory Control Sample Duplicate (LCSD) Precision						
LCSD	125	264	19	38	221	17
RPDs Within Criteria	125	264	19	38	221	17
LCSD Percent Precision	100	100	100	100	100	100
Field Sample Duplicate (FD) Precision						
FD	552	568	9	56	119	8
RPDs Within Criteria	552	568	8	56	114	7
FD Percent Precision	100	100	88.9	100	95.8	87.5
Laboratory Sample Duplicate (Lab-Dup) Precision						
Lab-Dup Measurements	NA	NA	NA	NA	149	10
RPDs Within Criteria	NA	NA	NA	NA	149	10
Lab-Dup Percent Precision	NA	NA	NA	NA	100	100

*Measurements include antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, nickel, selenium, silver, vanadium, and zinc
NA = Not applicable

Accuracy

For the purpose of determining data accuracy of sample analyses, all water and soil samples, including field QC samples (i.e., trip blanks, equipment rinsate samples, field blanks, etc.) were evaluated and incorporated into the accuracy calculation. As shown in [Table 4-7](#) and [Table 4-8](#), all accuracy rates are above 80 percent. Therefore, the dataset is determined to be acceptable for the

Table 4-6
Radiological Precision Measurements for CAU 357

Measurements	Gamma Spectroscopy	Isotopic Uranium	Isotopic Plutonium	Strontium-90	Tritium	Gross Alpha-Beta
Laboratory Sample Duplicate (Lab-Dup) Precision						
RPD	61	46	19	11	NA	NA
RPDs Within Criteria	61	46	16	11	NA	NA
Percent Precision	100	100	84.2	100	NA	NA
ND	555	37	35	15	1	2
NDs Within Criteria	555	37	32	15	1	2
Percent Precision	100	100	91.4	100	100	100
Field Sample Duplicate (FD) Precision						
RPD	18	17	3	NA	NA	NA
RPDs Within Criteria	18	17	1	NA	NA	NA
Percent Precision	100	100	33.3	NA	NA	NA
ND	180	10	15	9	NA	NA
NDs within criteria	180	10	15	9	NA	NA
Percent Precision	100	100	100	100	NA	NA

NA = Not applicable

DQI of accuracy. [Table 4-7](#) provides the chemical accuracy analysis results. [Table 4-8](#) provides the radiological accuracy analysis results.

Representativeness

The DQO process as identified in Appendix A of the SAFER Plan was used to address sampling and analytical requirements for CAU 357. During this process, appropriate locations were selected that enabled the samples collected to be representative of the population parameters identified in the DQO (the most likely locations to contain contamination and locations that bound COCs). The sampling locations identified in the Criterion 1 discussion meet this criteria. Therefore, the analytical data

Table 4-7
Chemical Accuracy Measurements for CAU 357

Measurements	ORGANICS				INORGANICS	
	VOCs	SVOCs	TPH (DRO)	PCBs	Metals*	Mercury
Matrix Spike (MS) Accuracy						
MS	140	242	26	36	298	20
RECs Within Criteria	140	242	26	36	279	20
MS Percent Accuracy	100	100	100	100	93.6	100
Laboratory Control Sample (LCS) Accuracy						
LCS	250	528	38	76	442	34
RECs Within Criteria	250	528	38	76	442	34
LCS Percent Accuracy	100	100	100	100	100	100
Surrogate Accuracy						
Total Measurements Analyzed	11,868	11,502	162	1,029	NA	NA
Total Measurements Not Affected by Out-of-Control Surrogates	11,661	11,360	162	1,013	NA	NA
Surrogate Percent Accuracy	98.3	98.8	100	98.4	NA	NA

*Measurements include antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, nickel, selenium, silver, vanadium, and zinc
NA = Not applicable

acquired during the CAU 357 corrective action investigation are considered representative of the population parameters.

Comparability

Field sampling, as described in the CAU 357 SAFER Plan (NNSA/NSO, 2003b), was performed and documented in accordance with approved procedures that are comparable to standard industry practices. Approved analytical methods and procedures were used to analyze, report, and validate the data. These are comparable to other methods used not only in industry and government practices, but most importantly are comparable to other investigations conducted for the NTS. Therefore, datasets within this project are considered comparable to other datasets generated using these same standardized DOE procedures, thereby meeting DQO requirements.

Table 4-8
Radiological Accuracy Measurements for CAU 357

Measurements	Gamma Spectroscopy	Isotopic Uranium	Isotopic Plutonium	Strontium-90	Tritium	Gross Alpha-Beta
Matrix Spike (MS) Accuracy						
MS	NA	NA	NA	NA	1	2
RECs Within Criteria	NA	NA	NA	NA	1	1
MS Percent Accuracy	NA	NA	NA	NA	100	50
Laboratory Control Sample (LCS) Accuracy						
Total Measurements	72	48	25	28	1	2
RECs Within Criteria	72	48	25	27	1	2
Percent Accuracy	100	100	100	96.4	100	100

Also, standard, approved field and analytical methods ensured that data were appropriate for comparison to the investigation action levels specified in the CAU 357 SAFER Plan.

Completeness

The CAU 357 SAFER Plan (Table 6-1) defines acceptable criteria for completeness to be 80 percent of CAS-specific noncritical analytes identified in the SAFER Plan having valid results and 100 percent of critical analytes (including Decision II samples) having valid results. Also, the data must be of sufficient high quality to be able to support the DQO decisions.

Rejected data were not used in the resolution of DQO decisions and are not counted towards meeting the completeness goals. The rejected data for CAU 357 CASs are provided in [Table 4-9](#), [Table 4-10](#), and [Table 4-11](#). The rejected data were not needed to define the presence or extent of COC contamination at any CAS within CAU 357. As shown in [Table 4-12](#) and [Table 4-13](#), the criteria for completeness was met.

Table 4-9
CAU 357 Rejected Data for CAS 08-09-01, Mud Pit
(Page 1 of 2)

Sample Number	Laboratory Method	Parameter	Matrix	Qualifier	Reason 1	Reason 2
357E006	SW8270	Pyrene	Soil	R	153	41
357E006	SW8270	Chrysene	Soil	R	153	41
357E005	SW8270	Benzo(a)Pyrene	Soil	R	153	
357E006	SW8270	Benzo(a)Pyrene	Soil	R	153	41
357E006	SW8270	Benzo(b)Fluoranthene	Soil	R	153	41
357E006	SW8270	Benzo(g,h,i)Perylene	Soil	R	153	41
357E006	SW8270	Benzo(k)Fluoranthene	Soil	R	153	41
357E006	SW8270	Di-N-Octyl Phthalate	Soil	R	153	41
357E006	SW8270	3,3'-Dichlorobenzidine	Soil	R	153	41
357E006	SW8270	Dibenzo(a,h)Anthracene	Soil	R	153	41
357E006	SW8270	Indeno(1,2,3-cd)Pyrene	Soil	R	153	41
357E006	SW8270	Bis(2-Ethylhexyl)Phthalate	Soil	R	153	41
357E005	SW8270	Benzo(b)Fluoranthene	Soil	R	153	
357E005	SW8270	Benzo(g,h,i)Perylene	Soil	R	153	
357E005	SW8270	Benzo(k)Fluoranthene	Soil	R	153	
357E005	SW8270	Dibenzo(a,h)Anthracene	Soil	R	153	
357E005	SW8270	Indeno(1,2,3-cd)Pyrene	Soil	R	153	
357E006	SW8270	Butyl Benzyl Phthalate	Soil	R	153	41
357E007	SW8270	Pyrene	Soil	R	153	
357E007	SW8270	Chrysene	Soil	R	153	
357E007	SW8270	Benzo(a)Pyrene	Soil	R	153	
357E006	SW8270	Benzo(a)Anthracene	Soil	R	153	41
357E007	SW8270	Benzo(a)Anthracene	Soil	R	153	
357E007	SW8270	Benzo(g,h,i)Perylene	Soil	R	153	
357E007	SW8270	Benzo(k)Fluoranthene	Soil	R	153	
357E007	SW8270	Di-N-Octyl Phthalate	Soil	R	153	
357E007	SW8270	3,3'-Dichlorobenzidine	Soil	R	153	
357E007	SW8270	Butyl Benzyl Phthalate	Soil	R	153	
357E007	SW8270	Dibenzo(a,h)Anthracene	Soil	R	153	
357E007	SW8270	Indeno(1,2,3-cd)Pyrene	Soil	R	153	
357E007	SW8270	Bis(2-Ethylhexyl)Phthalate	Soil	R	153	
357E007	SW8270	Benzo(b)Fluoranthene	Soil	R	153	

Table 4-9
CAU 357 Rejected Data for CAS 08-09-01, Mud Pit
(Page 2 of 2)

Sample Number	Laboratory Method	Parameter	Matrix	Qualifier	Reason 1	Reason 2
357E008	SW8270	Benzo(a)Pyrene	Soil	R	153	41
357E008	SW8270	Benzo(a)Anthracene	Soil	R	153	41
357E008	SW8270	Benzo(b)Fluoranthene	Soil	R	153	41
357E008	SW8270	Benzo(g,h,i)Perylene	Soil	R	153	41
357E008	SW8270	Benzo(k)Fluoranthene	Soil	R	153	41
357E008	SW8270	Di-N-Octyl Phthalate	Soil	R	153	41
357E008	SW8270	3,3'-Dichlorobenzidine	Soil	R	153	41
357E008	SW8270	Butyl Benzyl Phthalate	Soil	R	153	41
357E008	SW8270	Indeno(1,2,3-cd)Pyrene	Soil	R	153	41
357E008	SW8270	Bis(2-Ethylhexyl)Phthalate	Soil	R	153	14
357E008	SW8270	Dibenzo(a,h)Anthracene	Soil	R	153	41
357E008	SW8270	Pyrene	Soil	R	153	41
357E008	SW8270	Chrysene	Soil	R	153	41

Reason 41 = Matrix Effects may exist.

Reason 153 = Internal area response show extremely low count.

Table 4-10
CAU 357 Rejected Data for CAS 10-09-06, Mud Pit; Stains; Materials

Sample Number	Laboratory Method	Parameter	Matrix	Qualifier	Reason 1	Reason 2
357K004	SW8270	Benzo(a)Pyrene	Soil	R	153	41
357K004	SW8270	Benzo(b)Fluoranthene	Soil	R	153	41
357K004	SW8270	Benzo(g,h,i)Perylene	Soil	R	153	41
357K004	SW8270	Benzo(k)Fluoranthene	Soil	R	153	41
357K004	SW8270	Dibenzo(a,h)Anthracene	Soil	R	153	41
357K004	SW8270	Indeno(1,2,3-cd)Pyrene	Soil	R	153	41

Reason 41 = Matrix Effects may exist.

Reason 153 = Internal area response show extremely low count.

Table 4-11
CAU 357 Rejected Data for CAS 04-26-03, Lead Bricks

Sample Number	Laboratory Method	Parameter	Matrix	Qualifier	Reason 1	Reason 2
357M506	SW8270	Di-N-Octyl Phthalate	Soil	R	153	41
357M508	SW8270	Pyrene	Soil	R	153	41
357M508	SW8270	Chrysene	Soil	R	153	41
357M506	SW8270	3,3'-Dichlorobenzidine	Soil	R	153	41
357M506	SW8270	Butyl Benzyl Phthalate	Soil	R	153	41
357M506	SW8270	Dibenzo(a,h)Anthracene	Soil	R	153	41
357M506	SW8270	Indeno(1,2,3-cd)Pyrene	Soil	R	153	41
357M507	SW8270	Pyrene	Soil	R	153	41
357M507	SW8270	Chrysene	Soil	R	153	41
357M507	SW8270	Butyl Benzyl Phthalate	Soil	R	153	41
357M507	SW8270	Dibenzo(a,h)Anthracene	Soil	R	153	41
357M507	SW8270	Indeno(1,2,3-cd)Pyrene	Soil	R	153	41
357M507	SW8270	Benzo(a)Anthracene	Soil	R	153	41
357M508	SW8270	Bis(2-Ethylhexyl)Phthalate	Soil	R	153	41
357M506	SW8270	Bis(2-Ethylhexyl)Phthalate	Soil	R	153	41
357M506	SW8270	Benzo(b)Fluoranthene	Soil	R	153	41
357M506	SW8270	Benzo(g,h,i)Perylene	Soil	R	153	41
357M508	SW8270	Benzo(k)Fluoranthene	Soil	R	153	41
357M508	SW8270	Di-N-Octyl Phthalate	Soil	R	153	41
357M508	SW8270	3,3'-Dichlorobenzidine	Soil	R	153	41
357M507	SW8270	Benzo(a)Pyrene	Soil	R	153	41
357M508	SW8270	Butyl Benzyl Phthalate	Soil	R	153	41
357M506	SW8270	Benzo(a)Pyrene	Soil	R	153	41
357M508	SW8270	Dibenzo(a,h)Anthracene	Soil	R	153	41
357M508	SW8270	Indeno(1,2,3-cd)Pyrene	Soil	R	153	41
357M508	SW8270	Benzo(a)Pyrene	Soil	R	153	41
357M508	SW8270	Benzo(b)Fluoranthene	Soil	R	153	41
357M508	SW8270	Benzo(g,h,i)Perylene	Soil	R	153	41
357M507	SW8270	Benzo(b)Fluoranthene	Soil	R	153	41
357M507	SW8270	Benzo(g,h,i)Perylene	Soil	R	153	41
357M508	SW8270	Benzo(a)Anthracene	Soil	R	153	41
357M506	SW8270	Pyrene	Soil	R	153	41
357M506	SW8270	Chrysene	Soil	R	153	41
357M506	SW8270	Benzo(k)Fluoranthene	Soil	R	153	41
357M507	SW8270	Di-N-Octyl Phthalate	Soil	R	153	41
357M507	SW8270	3,3'-Dichlorobenzidine	Soil	R	153	41
357M506	SW8270	Benzo(a)Anthracene	Soil	R	153	41
357M507	SW8270	Benzo(k)Fluoranthene	Soil	R	153	41

Reason 41 = Matrix Effects may exist.

Reason 153 = Internal area response show extremely low count.

Table 4-12
Chemical Completeness Measurements for CAU 357

Completeness Parameters	ORGANICS				INORGANICS	
	VOCs	SVOCs	TPH (DRO)	PCBs	Metals*	Mercury
Sample Analysis Completeness						
Total Samples Sent to Laboratory	173	154	162	147	270	147
Total Samples Analyzed	172	154	162	147	270	147
Total Samples Not Analyzed by the Laboratory	1	0	0	0	0	0
Percent Completeness	99.4	100	100	100	100	100
Measurement Usability Completeness.						
Total Measurements **	11,868	11,502	162	1,029	2181	147
Total Measurements Rejected - Field	0	0	0	0	0	0
Total Measurements Rejected - Lab/Matrix	0	110	0	0	0	0
Percent Completeness	100	99.0	100	100	100	100

*Measurements include antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, nickel, selenium, silver, vanadium, and zinc
NA = Not applicable

**Measurements include reanalyses

Table 4-13
Radiological Completeness Measurements for CAU 357
(Page 1 of 2)

Completeness Parameters	Gamma Spectroscopy	Isotopic Uranium	Isotopic Plutonium	Strontium-90	Tritium	Gross Alpha Beta
Sample Analysis Completeness						
Total Samples Sent to Laboratory	167	161	165	161	1	1
Total Samples Analyzed	167	161	165	161	1	1
Total Samples Not Analyzed by the Laboratory	0	0	0	0	0	0
Percent Completeness	100	100	100	100	100	100

Table 4-13
Radiological Completeness Measurements for CAU 357
(Page 2 of 2)

Completeness Parameters	Gamma Spectroscopy	Isotopic Uranium	Isotopic Plutonium	Strontium-90	Tritium	Gross Alpha Beta
Measurement Usability Completeness						
Total Measurements *	3,673	483	330	161	1	2
Total Measurements Rejected - Field	0	0	0	0	0	0
Total Measurements Rejected - Lab/Matrix	0	0	0	0	0	0
Percent Completeness	100	100	100	100	100	100

*Measurements include reanalyses

4.1.1.1.2 DQO Provisions to Limit False Positive Decision Error

The false acceptance decision error was controlled by assessing the potential for false positive analytical results. Quality assurance/quality control samples such as field blanks, trip blanks, laboratory control samples, and method blanks were used to determine if a false positive analytical result may have occurred. No contaminants were detected in the 57 QA/QC samples at concentrations that exceeded the FALs during the investigation.

Proper decontamination of sampling equipment and the use of certified clean sampling equipment and containers also minimized the potential for cross contamination that could lead to a false positive analytical result.

4.1.1.2 Decision II

Decision Rules:

- If the observed concentration of any COC in a Decision II sample exceeds the FALs, then additional samples will be collected to complete the determination of the extent.
- If observed COC concentrations in a sample from all lateral and vertical directions are less than the FALs, then the decision will be that the extent of contamination has been defined and further assessment is not required.

Null Hypotheses - The extent of a COC has not been defined.

Alternative condition - The extent of a COC has been defined.

Population Parameter - The population parameter for Decision II data will be the observed concentration of each unbounded COC in any sample.

4.1.1.2.1 DQO Provisions to Limit False Negative Decision Error

A false rejection decision error (where consequences are more severe) is controlled by meeting the following criteria:

1. Having a high degree of confidence that the sample locations selected will identify the extent of the COCs.
2. Having a high degree of confidence that analyses conducted will be sufficient to detect any COCs present in the samples.
3. Having a high degree of confidence that the data set is of sufficient quality and completeness.

Criterion 1:

The following criteria, as stipulated in the CAU 357 DQOs (NNSA/NSO, 2003b), were used in selecting Decision II sample locations:

- Selection of sampling locations associated with vertical extent was accomplished by the depth sequences used during the Decision I sampling for each CAS.
- Selection of sample locations associated with lateral extent was accomplished by measuring a maximum of 15 ft from the area identified as being contaminated and/or measuring to the extent of the mud pit boundary in a triangular pattern surrounding the impacted area.

In general, soil sample analytical results demonstrated that the vertical and lateral extent of COCs were defined. The extent sample locations and concentrations for the COC at CAS 10-09-06 are shown in [Figure 4-1](#).

Criterion 2:

Decision II soil samples with the corresponding COCs were collected at the following CASs:

- CAS 08-09-01- TPH-DRO
- CAS 10-09-06- Co-60
- CAS 04-26-03- Lead

The second criterion for extent (sensitivity) was accomplished for all analyses. The analytes listed above did not fail the sensitivity criteria for any samples. The chemical and radiological analytes that failed the sensitivity criteria are provided in [Table 4-1](#) and [Table 4-2](#).

Criterion 3:

To satisfy the third criterion for extent, the entire dataset, as well as individual sample results, were assessed against the DQIs of precision, accuracy, comparability, completeness, and representativeness, as defined in the Industrial Sites QAPP (NNSA/NV, 2002). The DQI discussion is presented under Criteria 3 for Decision I.

4.1.1.2.2 DQO Provisions to Limit False Positive Decision Error

The false acceptance decision error was controlled by assessing the potential for false positive analytical results. Quality assurance/quality control samples such as field blanks, trip blanks, laboratory control samples, and method blanks were used to determine if a false positive analytical result may have occurred. No false positive analytical results were detected in the 57 QA/QC samples submitted during this investigation.

Proper decontamination of sampling equipment and the use of certified clean sampling equipment and containers also minimized the potential for cross contamination that could lead to a false positive analytical result.

4.1.2 Conduct a Preliminary Data Review

A preliminary data review was conducted by reviewing laboratory QA narratives and inspecting the data. The contract analytical laboratories generate a QA narrative when data quality does not meet contractual requirements. All data received from the analytical laboratories met contractual

requirements and a QA report was not generated. Data were validated and verified to ensure that the measurement systems performed in accordance with the criteria specified and that the validated dataset quality is satisfactory.

4.1.3 *Select the Test and Identify Key Assumptions*

The test for making DQO Decision I was the comparison of the maximum analyte result from each CAS to the corresponding FALs. The test for making DQO Decision II was the comparison of all COC analyte results from each bounding sample to the corresponding FALs.

The key assumptions that could impact a DQO decision are listed in [Table 4-14](#).

4.1.4 *Verify the Assumptions*

The results of the investigation support the key assumptions identified in the CAU 357 DQOs except as listed below:

- Exception: The TPH DRO identified at CAS 08-09-01 was the result of oil filters/debris on the surface within the mud pit and was not considered to be associated with the drilling process/drilling mud.
- Impact: This did not impact the CSM.
- Exception: It was estimated in the SAFER Plan that approximately 50 lead bricks were located at CAS 04-26-03. During the course of the investigation approximately 1,000 lead bricks/debris were removed from an area extending outside the CAS boundary. It was also determined that the surface soil within the “high-density area” was contaminated with lead.
- Impact: No impact to the CSM.

All data collected during the investigation supported the CSMs with the exceptions noted in this section. These exceptions did not invalidate the CSMs presented in the SAFER Plan, nor did they necessitate revisions to the CSMs.

4.1.5 *Results*

This section resolves the two DQO decisions for each of the CAU 357 CASs.

Table 4-14
Key Assumptions

Exposure Scenario	<u>CSM #1 and CSM #2:</u> Site workers may be exposed to COCs through oral ingestion, inhalation, or dermal contact (by absorption) of COCs absorbed onto the soils/drilling mud. Site workers that may become exposed to the contamination is limited to industrial site workers, construction/remediation workers, and military personnel conducting training. The investigation results did not reveal any potential exposure scenarios other than those identified in CSMs.
Affected Media	<u>CSM #1 and CSM #2:</u> Surface soil and shallow subsurface soil are the possible affected media at these CASSs. Perched (shallow) groundwater or deep groundwater contamination is not a concern at these CASSs. Contaminants migrating to regional aquifers are not considered. The investigation results did not reveal any affected media other than those identified in CSMs.
Location of Contamination/Release Points	<u>CSM #1 and CSM #2:</u> The native soil interface below and adjacent to the disposed waste. Contaminant migration from the CASSs is expected to be in soil adjacent to vertically encountered native soil interface. The investigation results did not reveal any locations of contamination or release points other than those identified in CSMs.
Transport Mechanisms	<u>CSM#1:</u> Contaminants can be expected to be found relatively close to release points or in low areas where settling may occur and evaporation of storm water run-off/ponding occurred concentrating potentially dissolved constituents. Infiltration beyond the shallow substrate is not a concern. <u>CSM #2:</u> Contaminants can be expected to be found relatively close to release points. The investigation results did not reveal any transport mechanisms other than those identified in the CSMs.
Preferential Pathways	<u>CSM #1:</u> Vertical migration through soil due to gravity with minor lateral migration to low points due to gravity and low permeability soils (e.g., drilling muds and clay) were identified as the preferential pathways at these CASSs. <u>CSM #2:</u> Vertical migration out of the building into native soil due to gravity and lateral migration across the building floor. The investigation results did not reveal any preferential pathways other than those identified in CSMs.
Lateral and Vertical Extent of Contamination	<u>CSM #1 and CSM #2:</u> Subsurface contamination, if present, is contiguous and decreases with distance and depth from the source. Surface contamination may occur laterally as a result of a spill or storm water run-off. Contaminants generally decreased with distance and depth as identified in the CSMs.
Groundwater impacts	<u>CSM #1 and CSM #2:</u> Groundwater is not expected to be impacted as a result of site operations conducted at CAU 357. The vertical extent of contaminants identified during the investigation were defined and did not extend to groundwater as stated in the CSMs.
Future Land Use	<u>CSM #1 and CSM #2:</u> Land use in the areas of CAU 357 are limited to industrial land use. The investigation results did not reveal any future land uses other than those identified in the CSMs.

4.1.5.1 Decision I

Decision Rule: If the concentration of any COPC in a target population exceeds the PALs for that COPC during the initial investigation, then that COPC is identified as a COC and Decision II sampling will be conducted.

Result: The following CASs identified COPCs that exceeded the screening PALs.

- CAS 08-09-01 - TPH-DRO
- CAS 08-09-03 - Cs-137
- CAS 10-09-02 - Cs-137 and Pu-239
- CAS 10-09-06 - Co-60
- CAS 04-26-03 - Lead

Decision II soil samples were collected to assess the extent of the COCs at these CASs with the exception of CAS 08-09-03 and 10-09-02. The analytical data obtained from CAS 08-09-03 and 10-09-02 was evaluated against the FAL that was calculated using the RESRAD computer code. The analytical data obtained from soil samples collected at these CASs did not exceed the calculated FALs, subsequently no Decision II soil samples were collected at these CASs.

Decision Rule: If all COPC concentrations are less than the corresponding PALs, then the decision will be no further action.

Result: No COCs were identified in samples collected from CASs 07-09-02, 07-09-03, 07-09-04, 07-09-05, 08-09-02, 10-09-04, 10-09-05, 01-99-01, and 25-15-01 at concentrations that exceeded the PALs. No further action was identified as the recommended corrective action alternative for these CASs.

4.1.5.2 Decision II Decision Rules

Decision Rule: If the observed concentration of any COC in a Decision II sample exceeds the screening PALs or calculated FALs, then additional samples will be collected to complete the determination of the extent.

Result: The vertical and lateral extent of COCs at CASs 08-09-01, 10-09-06, and 04-26-03 were defined.

Decision Rule: If observed COC concentrations in a sample from all lateral and vertical directions are less than the screening PALs or calculated FALs, then the decision will be that the extent of contamination has been defined and further assessment is not required.

Result: The vertical and lateral extent of COCs at CASs 08-09-01, 10-09-06, and 04-26-03 were defined. The impacted areas were excavated at CASs 08-09-01, and 04-26-03. Verification samples were collected to evaluate the effectiveness of the implemented remedial strategy. The analytical results obtained from the verification samples indicated no detections above the PALs or calculated FALs. No further assessment is required and the information is sufficient to implement the appropriate closure alternative. A use restriction is recommended at CASs 10-09-06 and 04-26-03. [Figure 4-1](#) and [Figure 4-2](#) are maps showing sample locations with the corresponding sample analytical results.

4.2 Use Restriction

Use restrictions will be applied as part of the close in place recommendation at CASs 10-09-06, 04-26-03, and 25-15-01. The reasons for implementing the use restrictions at these CASs are provided in the following sections. The completed use restriction forms with figures showing the area of the imposed use restriction for these CASs are provided as [Appendix G](#).

4.2.1 CAS 10-09-06

The restrictions at CAS 10-09-06 will be applied to control the use and limit access to the site to prevent the inadvertent exposure to Co-60. The recommendation for a use restriction at this CAS is based on the detection of Co-60 in a surface soil sample at concentrations that exceeded the risk-based FAL of 48 pCi/g. It was determined using RESRAD code that the current maximum dose to a site worker under a low-occupancy land-use scenario would be 50 mrem/yr, which is above the NTS dose constraint of 25 mrem/yr. It was also determined based on the short half-life of Co-60 that the current maximum dose of 50 mrem/yr would decrease to below the 25 mrem/yr dose constraint after approximately 6 years. The area of contamination will be fenced using two-strand wire and signs posted according to the use-restriction guidance. It is anticipated that all administrative controls

may be reevaluated after approximately 6 years. The following information supports the concept of closure of the CAS with administrative controls:

- a. Depth to groundwater in Area 10 wells generally ranges from approximately 1,067 to 2,066 ft bgs. Analytical data indicate that COCs are located in the surface soils at the site at concentrations that exceed the FAL. Analytical data from a soil sample collected at 1.5 to 2 ft bgs indicated no detections of COCs above the FALs. This demonstrates that minimal vertical migration has occurred since the time release.
- b. The nearest drinking water well to CAS 10-09-06 is UE-16d Eleana Water Well. It is located in Area 18 of the NTS, approximately 13,650 meters (m) southwest of this CAS (USGS, 2002).
- c. The soil at the site and surrounding area are composed of alluvial deposits consisting of fine to coarse sands and silts with gravels. Geotechnical test were not conducted on the soil at the site.
- d. Average annual precipitation for valleys in the South-Central Great Basin ranges from 3 to 6 in. bgs (Winograd and Thordarson, 1975). Annual evaporation is roughly 5 to 25 times the annual precipitation (Winograd and Thordarson, 1975). The high evaporation and low precipitation rates create a negative water balance for the area; therefore, no driving force associated with precipitation is available to mobilize COCs vertically.
- e. The type of regulated substance found during the site investigation was the radionuclide Co-60. Cobalt-60 has a half-life of 5.271 years (Turner, 1995). Downward migration of the Co-60 is slowed by the following parameters:
  - Soil saturation - the soil tends to be very dry, especially near the surface and shallow subsurface where the COCs are concentrated.
  - Soil particle adsorption/desorption - radionuclides tend to adsorb to the soil particles with little desorption as suggested by the limited vertical migration of COCs.
- f. The lateral extent of contamination is defined by analytical data demonstrating minimal lateral mobility. The vertical extent of contamination is confined to the surface at location K04 based on the laboratory analytical data.
- g. Presently, CAS 10-09-06 is located on a government-controlled facility. The NTS is a restricted area that is guarded on a 24-hour, 365-day per year basis; unauthorized personnel are not admitted to the facility. The land-use scenarios limit future uses to industrial activities.
- h. Preferred routes of vertical and lateral migration are limited. Lateral migration is limited to the boundaries of the mud pit and vertical migration is minimal based on the analytical data.

- i. No building structures are located on the site.
- j. No hazards relating to fire, vapor, or explosion have been identified on the site.
- k. No other site-specific factors are known at this time.

4.2.2 CAS 04-26-03

The restrictions at CAS 04-26-03 will be applied to control the use and limit access to the lead brick/debris “high-density area” to prevent exposure to lead in excess of 10 days/year upon which the FAL was calculated. The recommendation for a use restriction at this CAS is a best management practice based on the elevated concentrations of lead in the surface soil within the lead brick/debris “high-density area.” The area of contamination will have signs posted according to the use-restriction guidance. The following information supports the concept of closure of the CAS with administrative controls:

- a. Depth to groundwater in the Area 4 wells generally ranges from approximately 366 to 1,732 ft bgs. Analytical data indicate that lead is present in soil at two surface sample locations within the lead brick/debris “high-density area” at concentrations that exceed the screening PAL. These concentrations of lead did not extend to a depth greater than 16 in. bgs. This demonstrates that minimal vertical migration has occurred since the time release.
- b. The nearest drinking water well to CAS 04-26-03 is UE-16d Eleana Water Well. It is located in Area 16 of the NTS; 5,592.5 meters (m) southwest of this CAS (USGS, 2002)
- c. The soil at the site and surrounding area are composed of alluvial deposits consisting of fine to coarse sands and silts with gravels. Geotechnical tests were not conducted on the soil at the site.
- d. Average annual precipitation for valleys in the South-Central Great Basin ranges from 3 to 6 in. bgs (Winograd and Thordarson, 1975). Annual evaporation is roughly 5 to 25 times the annual precipitation (Winograd and Thordarson, 1975). The high evaporation and low precipitation rates create a negative water balance for the area; therefore, limiting the driving force of precipitation to mobilize COCs vertically.
- e. The type of regulated substance found during the site investigation was lead. Downward migration of lead is slowed by the following parameters:
  - Soil saturation - the soil tends to be very dry, especially near the surface and shallow subsurface where the COCs are concentrated.

- Soil particle adsorption/desorption - radionuclides tend to adsorb to the soil particles with little desorption as suggested by the limited vertical migration of COCs.
- f. The lateral extent of contamination was assessed by collecting surface soil samples from between lead brick locations at the site. The analytical data obtained from these samples indicate concentration of lead above the screening PAL at two locations within the lead brick/debris “high-density area” demonstrating minimal lateral migration. The vertical extent of contamination did not exceed 24 in. bgs.
- g. Presently, CAS 04-26-03 is located on a government-controlled facility. The NTS is a restricted area that is guarded on a 24-hour, 365-day per year basis; unauthorized personnel are not admitted to the facility. The land-use scenarios limit future uses to industrial activities.
- h. Preferred routes of vertical and lateral migration are limited. Lateral and vertical migration is limited minimal based on the analytical data.
- i. The remains of the T-4 Bunker is the only building structure on the site.
- j. No hazards relating to fire, vapor, or explosion have been identified on the site.
- k. No other site-specific factors are known at this time.

4.2.3 CAS 25-15-01

The restrictions at CAS 25-15-01 will be applied to control the use, limit access, and prevent unauthorized intrusive activities within the waste dump area. No COPCs were identified in soil samples collected at this site. The use restriction is recommended specifically to restrict future land use and not allow activities that would alter or modify the containment controls without receiving the appropriate concurrences. Monuments with signage will be placed to designate the boundaries of the waste dump and open pit.

5.0 Conclusions and Recommendations

Based on the results of the closure activities no further clean up activities are necessary for CAU 357.

The NNSA/NSO provides the following recommendations:

- No Further Action at CASs 07-09-02, 07-09-03, 07-09-04, 07-09-05, 08-09-02, 08-09-03, 10-09-02, 10-09-04, 10-09-05, and 01-99-01.
- Clean Closure at CAS 08-09-01.
- Close in Place with administrative controls at CASs 10-09-06, 04-26-03, and 25-15-01.
- A Notice of Completion is requested from NDEP for the closure of CAU 357.
- Corrective Action Unit 357 should be moved from Appendix III to Appendix IV of the FFACO.

5.1 Justification for No Further Action

Analytical results obtained from soil samples collected at CASs 07-09-02, 07-09-04, 07-09-05, 08-09-02, 08-09-03, 10-09-02, 10-09-04, 10-09-05, and 01-99-01 indicated no detections of COPCs above the FALs. Analytical results obtained from a surface soil sample at CAS 07-09-03 indicated a concentration of Pu-239 above the FAL. The surface soil sample was collected from native soil and did not include drilling mud associated with the drilling process or mud pit. The Pu-239 was likely present at this location due to fallout from atmospheric testing at the NTS; therefore, it was not considered a COC at this CAS. As a best management practice and to mitigate potential personnel exposure, the soil impacted with Pu-239 was excavated and verification soil samples were collected. The analytical data supports the recommendation for no further action at these CASs.

5.2 Justification for Clean Closure

Analytical results obtained from soil samples collected at CAS 08-09-01 indicated concentrations of TPH-DRO above the FAL. Decision II soil samples were collected to define the extent of TPH-DRO contamination at the site. The impacted area was remediated by excavating approximately 4.5 cubic yards of contaminated soil. Verification samples were collected to evaluate the effectiveness of the implemented remediation strategy. The analytical results of the verification samples indicated no

detections of COCs above the FALs. Verification sample analytical results and the implemented remediation strategy supports clean closure of this CAS. [Appendix B](#) contains the closure certification.

5.3 *Justification for Close in Place with Use Restriction*

The justifications for the recommendation of a use restriction at CASs 10-09-06, 04-26-03, and 25-15-01 are provided in the following sections. Use restrictions for these CASs are provided in [Appendix G](#).

5.3.1 CAS 10-09-06

The concentration of Co-60 detected in the surface soil sample 357K005 collected at location K04 currently exceeds the FAL. As a result of the short half-life of Co-60 and based on the RESRAD calculations, it was determined that the current maximum dose of 50 mrem/yr would decrease to below the 25 mrem/yr dose constraint after approximately 6 years. These results currently support a use restriction at this CAS. It is anticipated that all administrative controls may be reevaluated after approximately 6 years. The method used to calculate the risk-based FALs is provided in [Appendix I](#).

5.3.2 CAS 04-26-03

A use restriction is recommended as a best management practice at this CAS. The use restriction is intended to prevent unnecessary access to the “high-density area” to enforce the occasional use scenario and provide protection from potential changes to future land use.

5.3.3 CAS 25-15-01

Corrective Action Site 25-15-01 is an abandoned waste dump. Analytical results obtained from soil samples collected at the site did not identify COPCs at concentrations above the PALs. Close in place with administrative controls is recommended at this CAS to limit access and prevent unauthorized intrusive activities.

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Appendix A

DQOs as Developed in the SAFER Plan for CAU 357

A.1.0 Data Quality Objectives

This section provides the seven steps of the DQO process as presented in the CAU 357 SAFER Plan (NNSA/NSO, 2003). The CAS-specific background information is not included in this section. Refer to the CAU 357 SAFER Plan for the CAS-specific background information.

A.1.1 Step 1, State the Problem

This initial step of the seven-step DQO process for CAU 357 identifies the planning team participants, describes the problem that has initiated the CAU 357 SAFER investigation, and develops the Conceptual Site Models.

A.1.1.1 DQO Planning Team Members

The DQO planning team consists of representatives from NDEP, NNSA/NSO, Shaw, and BN. The primary decision-makers include NDEP and NNSA/NSO representatives. Decision-makers will receive notifications as work progresses and when decision points are reached within the SAFER process.

A.1.1.2 Describe the Problem

Corrective Action Unit 357 is being investigated because some data gaps exist concerning the nature and extent of potential contamination and this data is necessary to evaluate and recommend with certainty corrective action alternatives for the individual CASs.

As a result of activities for the previously described CASs, potentially known but uncontrolled, or at least undocumented release of waste(s) of hazardous and/or radioactive constituents may be present at concentrations that could potentially pose a threat to human health and the environment. In addition, contamination may be present at concentrations and locations without appropriate controls (i.e., use restrictions). Although the CASs are inactive and abandoned, past activities are not well documented and may not comply with the requirement of the future land uses.

A.1.1.3 Develop Conceptual Site Models

The CSM describes the most probable current conditions at each CAS and defines the assumptions that are the basis for identifying appropriate CAS-specific sampling strategies and data collection methods. The CSMs set the stage for assessing how contaminants could reach receptors both in the present and future by addressing contaminant nature and extent, transport mechanisms and pathways, potential receptors, and potential exposures to receptors. Accurate CSMs are important because they serve as the basis for all subsequent inputs and decisions throughout the DQO process.

An important concept is that CSMs are based on identifying the release mechanism migration pathways that may influence sampling of an affected media. CSMs are not chemical constituent, geographic location, nor CAS dependent.

An important element of a CSM is the expected Fate and Transport of contaminants, which infer how contaminants move (transport mechanism) through site media and where they can be expected (location of contaminants) in the environment (affected media). The expected fate and transport is based on distinguishing physical characteristics of the contaminants and media; whereby, characteristics of contaminants include solubility, density, and particle size; and media include permeability, saturation, sorting, chemical composition, and adsorption coefficients.

Contaminants migrating to regional aquifers are not considered a likely scenario at CAU 357 based on low annual average precipitation rates, high potential evaporation, and low mobility of expected COPCs (e.g., SVOCs, PCBs, petroleum hydrocarbons, and metals).

Currently, the potential for exposure to contamination at the CAU 357 CASs is limited to industrial site workers, construction/remediation workers, and military personnel conducting training. These human receptors may be exposed to COPCs through oral ingestion, inhalation, dermal contact (absorption) of soils and/or debris (e.g., equipment, concrete) due to inadvertent disturbance of these materials or irradiation by radioactive material. The future land-use scenarios identified in *Nevada Test Site Resource Management Plan* (DOE/NV, 1998) limit future uses of the CASs to various nonresidential (e.g., industrial) uses. Nonresidential uses include defense and nondefense research, development, testing activities, and commercial-use capabilities.

For CAU 357, two CSMs have been developed: one CSM for the 11 Mud Pit(s) CASs; the Waste Dump (construction disposal landfill) CAS; and Lead Bricks CAS. The other CSM model is for the remaining CAS identified as Boxes/Pipes.

The historical background information provided in the SAFER Plan's main document (Section 2.0) were used to develop the two CSMs identified for CAU 357. The following is a list of elements and characteristics common to all 14 CASs that are essential to the development and understanding of an effective CSM:

- **Exposure Scenario:** Site workers may be exposed to COCs through oral ingestion, inhalation, external exposure to radiation, or dermal contact (by absorption) of COCs absorbed onto the soils. Exposure is due to inadvertent disturbance of the contaminated soils and/or contaminated structures.
- **Affected Media:** This is typically the surface soil, shallow subsurface soil, and potentially perched (shallow) groundwater, which is not identified in these CAS areas. The lack of groundwater impact is due primarily to: (1) low precipitation, (2) high evapotranspiration rate, (3) soils often are clay-rich (common to the NTS), and (4) depth to groundwater (DOE/NV, 1997b). There is no downward driving force with limited precipitation. The areas arid environment and extreme summer temperatures ensures shallow moisture is baked out of the near subsurface, creating a dry sponge-like effect, whereby precipitation that does occur has limited infiltration. Clays exhibit a high surface area (increased porosity potential), which promotes COC absorption and inhibits migration. They are deposited in an overlapping manner in a relatively homogeneous lateral distribution (natural bedding); and their small particle size fills pore space, blocking pathways within the soil-media (reduced permeability). Hence, clays greatly inhibit vertical migration of aqueous-based contaminants downward. Also, the depth to groundwater is hundreds of feet below ground surface. Thus, deep subsurface contamination is most likely not a concern.
- **Location of Contamination/Release Points:** The native soil interface below and adjacent to the disposed waste is the most likely location for soil contamination. Any contaminants migrating from CASs, regardless of physical or chemical characteristics, are expected to be in soil adjacent to disposal features lateral and vertical native-soil interfaces.
- **Transport Mechanisms:** In general, contaminants with low solubility, high density, and/or high affinity can be expected to be found relatively close to release points. Contaminants with small particle size, high solubility, low density, and/or low affinity can be expected to be found further from release points, or in low areas where settling may occur and evaporation of ponding will concentrate dissolved constituents. COPCs can impact various media (air, soil, water) dependent on the transport mechanism. COPCs that can volatilize may impact the air, and COPCs contained in a liquid media or are "dusts" dissolved by rainwater may infiltrate the subsoil and potentially impact groundwater. COPCs that volatilize (VOCs) are not an

anticipated concern at these CASs because of the duration they have experienced inactivity; whereby, if they were present at some past date, they would be depleted during volatilization over time. Infiltration of any COPC, beyond shallow substrate, is not a concern at these sites, as discussed in the groundwater impacts section.

- **Preferential Pathways:** Due to the nature of the COPCs, the preferential pathways at the CASs are typically limited to vertical migration due to gravity and minor lateral migration due to localized porosity and permeability increases/changes within the substrate, or confining (impermeable) layers redirecting flow direction, which is always gravity driven, to low points.
- **Lateral and Vertical Extent of Contamination:** Contamination, if present, is expected to be contiguous. Concentrations are expected to decrease with distance and depth from the source. Based on the depth to groundwater, which varies for each CAS, groundwater contamination is not considered a likely scenario. Surface migration may occur as a result of a spill, or as runoff of precipitation. Surface migration is a biasing factor considered in the selection of sampling points.
- **Groundwater Impacts:** Groundwater is not expected to be impacted in Areas 1, 4, 7, 8, 10, and 25 of the NTS for the following reasons. Percolation of precipitation through subsurface media serves as the major driving force for migration of contaminants. However, due to the arid environment of the NTS, percolation of precipitation is very small and migration of contaminants has been shown to be very limited. Evaporation potentials significantly exceed precipitation. The average annual precipitation across the CAU 357 sites ranges from 6 to 8 in. per year (DOE/NV, 1997b).
  - Depth to groundwater in Area 1 wells (Boxes & Pipes CAS) generally ranges from approximately 543 to 1,630 ft bgs.
  - Depth to groundwater in Area 4 wells (Lead Bricks CAS) generally ranges from approximately 366 to 1,732 ft bgs.
  - Depth to groundwater in Area 7 wells (4 Mud Pit CASs) generally ranges from approximately 1,067 to 1,976 ft bgs.
  - Depth to groundwater in Area 8 wells (3 Mud Pit CASs) generally ranges from approximately 2,052 to 2,164 ft bgs.
  - Depth to groundwater in Area 10 wells (4 Mud Pit CASs) generally ranges from approximately 1,067 to 2,066 ft bgs.
  - Depth to groundwater in Area 25 wells (Waste Dump CAS) generally ranges from approximately 924 to 1,040 ft bgs.
- **Future Land Use:** Areas 7, 8, and 10 are located within the Nuclear Test Zone, Areas 1 and 4 are located within the Nuclear and High Explosive Zone, and Area 25 is located within the

Yucca Mountain Site Characterization Zone under Alternative 3 (DOE/NV, 1998). These zones include compatible defense and nondefense research, development, and testing projects and activities. These land-use scenarios limit future uses to industrial activities; therefore, future residential uses are not considered.

A.1.1.3.1 CSM #1 for Mud Pits, Waste Dump, and Lead Bricks CASs

The basis for developing this CSM was process knowledge and historical records, which revealed a commonality to each of the CASs it represents. This CSM is different from the Boxes; Pipes CSM based on one or more of the following: (1) release (transport) mechanism, (2) potential migration pathways, and (3) things that would influence sampling strategies. The difference between the CSM CAS grouping is not dependent on: (1) types of contaminant(s), (2) geographic systems, or (3) being part of an engineered system. [Figure A.1-1](#) illustrates the CSM for the combined mud pit, waste dump, and lead bricks CASs. This diagram shows known and suspected locations of contaminants and potential pathways for physical transport. The following descriptions relate to [Figure A.1-1](#) illustrating mud pits, potential spill areas, waste dump features, and lead bricks within a defined scatter area.

- **Exposure Scenario:** Site workers may be exposed to COCs through oral ingestion, inhalation, or dermal contact (by absorption) of COCs absorbed onto the soils.
- **Affected Media:** This is typically the surface soil and shallow subsurface soil.
- **Location of Contamination/Release Points:** The native soil interface below and adjacent to the disposed waste is the most likely location for soil contamination. Any contaminants migrating from CASs are expected to be in soil adjacent to vertically encountered native-soil interfaces.
- **Transport Mechanisms:** Contaminants can be expected to be found relatively close to release points or in low areas where settling may occur and evaporation of ponding will concentrate dissolved constituents. COPCs that volatilize (VOCs) are not an anticipated concern. COPC infiltration beyond shallow substrate is not a concern at these CAS sites.
- **Preferential Pathways:** The preferential pathway at these CASs is limited to vertical migration of COPCs due to gravity.
- **Lateral and Vertical Extent of Contamination:** Contamination, if present, is expected to be contiguous. Concentrations are expected to decrease with distance and depth from the source. Surface migration is a biasing factor considered in the selection of sampling points.

Figure A.1-1
CAU 357, CSM #1: For Mud Pits, Waste Dump, and Lead Bricks

- **Groundwater Impacts:** The groundwater is expected to be impacted in Areas 4, 7, 8, 10, and 25. Due to the arid environment of the NTS, percolation of precipitation is very small and migration of contaminants has been shown to be very limited. Evaporation potentials significantly exceed precipitation. The annual precipitation across the CAU 357 sites ranges from 6 to 8 in. per year.
- **Future Land Use:** The land-use scenarios (previously discussed) limit future uses to industrial activities; therefore, future residential uses are not considered.

The mud pit specific items for this CSM include:

- The COPCs, if present, are associated with the (1) disposal of used drilling fluid and wastewater in the mud pits, and (2) potential effluent discharge from truck dumping activities. Surface and shallow subsurface soils are the affected media within each mud pit. The volume of particular contaminant(s) in the drilling fluid effluent is unknown.

- 1997 sample results at four of the mud pit CASs (i.e., 07-09-02, 07-09-04, 07-09-05, 08-09-01) indicated detections of VOCs, SVOCs, RCRA metals, TPH, and radionuclides. None of the results exceeded action levels or background, except for arsenic which was above action levels but within NTS background levels (Bordelois, 1998a, b, and c; Forsgren, 1998).
- Recirculation processes within the mud pits enhance volatilization of VOCs, thereby reducing the potential concentrations of any VOCs that may be present.

Potential contaminants listed below are associated with the discharged effluent in mud pits:

- Additives (e.g., polymers, chelating agents, diesel) used during drilling activities (LANL, 1991; Wuellner, 1994; Rowe, 2001). Whereby diesel within drilling muds is expected to be the primary COPC (TPH-diesel range organics) with the greatest potential for concentrations above action levels based on interviews (Wilkes, 2000; Witt, 2000) and process knowledge gained from similar investigations of the mud pits (e.g., CNTA) (DOE/NV, 1999a and b). Other fuels, grease, motor oil, antifreeze, and hydraulic fluids are compounds that may have leaked from trucks and also discharged into the mud pit effluent stream (Wilkes, 2000; Witt, 2000). Random dumping/spillage of constituents was not a common practice; therefore, it is considered minimal.
- Radionuclide contamination is not expected to be a major concern at these CASs based on historical information; however, the potential still exists based on process knowledge of the atmospheric testing activities conducted in Areas 7, 8, and 10 of the NTS. The primary radioisotopes expected, if present, based on previous sampling data and historical records are americium-241, cesium-137, cobalt-60, europium-152, europium-154, europium-155, plutonium-238, plutonium-239/240, strontium-90, uranium-234, uranium-235, and uranium-238 (NCRP, 1999; Adams, 2000).

While contaminants within a mud system may be present at locations throughout the system, they will tend to be present in higher concentrations at particular locations within the system based on distinguishing chemical and physical characteristics. For example, petroleum-based fuels in the mud slurry would tend to be found in higher concentrations near the surface (because they are less dense than water-based fluids and float) and lower concentrations near the bottom of the mud pits (DOE/NV, 1997a). Other distinguishing characteristics of contaminants such as high or low solubility, high or low density, and large or small particle size can also be used to draw inferences on the locations within the mud pit system where they could be expected to be present at higher concentrations. Sampling in these preferential locations will increase the probability of detecting contamination if it is present anywhere within the system.

The following four areas (A-D) represent the preferential sample locations within the mud pit system, as illustrated in cross-sectional view across a mud pit (Figure A.1-2):

Figure A.1-2
Typical Mud Pit Cross Section Illustrating Idealized Sampling Locations

- A: Near the surface and near the influent (recharge) location, generally located on the mud pit topographic high spot, being synonymous with the top of the drill cuttings pile. It is the highest point because drilled cuttings of coarse grade drop out as the mud's lofting turbulence ceases upon entering the placid liquid media within the pit, and mound there; while fines remaining in suspension drift off to quieter areas to settle out. It is important to keep in mind, sampling the cuttings mound represents observing a reverse stratigraphy (e.g., a hole would have its "deepest drilled" cuttings on the top of the pile and "closest to the surface" cuttings at the bottom of the pile). Also, light, nonaqueous phase liquids (LNAPLs) and VOCs and other light contaminant constituents, being less dense than water, float and migrate up.
- B: At the bottom of the pit (pit/native soil interface) near the influent location, generally located beneath sample point A is where COCs of dense, nonaqueous phase liquids (DNAPLs) that might be present would sink downward and accumulate at the bottom of the drill cuttings pile.

- C: Near the surface at the lowest surface elevation, generally the lowest topographic elevation which held the last evaporation pond, is where the suspended COC constituents would be concentrated.
- D: At the lowest elevation of the original pit bottom (pit/native soil interface), generally assumed to be located beneath Sample Point C, which may or may not be true. Geophysics can identify a drum buried in a mud pit, but it may or may not be able to contrast the native soil/mud pit base interface. Therefore, geophysics may not be able to identify the lowest point within best economic means. Expensive geophysics may not be necessary due to the knowledge that the reverse stratigraphy processes extend across the entirety of the pit. Fines in suspension seek low calm areas to settle in; whereby, a progressive and contiguous layering of deposited fines developed across the mud pit as the well is drilled deeper. This makes the assumption valid in that fine sediments and fine contaminated sediments are relatively evenly distributed across the mud pit's floor. Therefore, sampling beneath the Sample C location for Sample D will provide a reliable and repeatable representation of the type of contaminants located across the floor of the pit. This can be conducted without the inflated cost of performing expensive high-definition geophysics to contour map the pit bottom prior to collecting Sample D.

Infiltration of COPCs are assumed to be limited to less than 10 ft vertically and 5 ft laterally based on past investigations of several mud pits (DOE/NV, 1999a and b).

- It is assumed that the mud pits (and the construction disposal landfill) are not lined. In the absence of a physical barrier below the mud, downward vertical migration will be predominant over lateral migration. However, bentonite clay (native to NTS soils) has a low hydraulic conductivity and a high adsorption capacity which binds constituents, inhibiting migration into subsurface soils. According to historical documentation and process knowledge, clay was commonly used as a pond liner to prevent infiltration of water into underlying units. Vertical migration is limited because the mud pits are dry and potential evaporation exceeds precipitation.
- The densely welded volcanic tuff units that underlie a mud pit may tend to be highly fractured with increased transmissivity (USGS, 1970), dependent on proximity closeness to a given crater. The underground nuclear tests (i.e., Cyathus, Baneberry - Area 8, and Pinedrops-Bayou, Pinedrops-Sloat, and Pinedrops-Tawny - Area 10) conducted at U-8d and U-10as, respectively, probably induced additional vertical fracturing of these tuff units when the surface crater formed. These densely welded tuffs can provide preferential pathways to groundwater. However, the preferential pathway factors are far out weighted by factors that inhibit the migration of any COCs present in the mud. The highly adsorptive nature of mud (i.e., bentonite) binds the contaminant and inhibits the migration of constituents as previously discussed in this CSM. In addition, bentonite would create seals within fractures underlying the mud limiting infiltration of precipitation. Four of the mud pit CASs (08-09-01, 08-09-02, 08-09-03, and 10-09-02) are located within 500 ft of a surface crater rim, but are not in the

collapse zone; therefore, they are not anticipated to have experienced significant transmissivity inflation.

- Contamination, if present, is primarily confined laterally by the slope of the land surface to the historical and physical boundaries of each site such as the berms of each mud pit. Unsaturated conditions due to arid climate limit the potential for lateral migration into surrounding soils, and promotes vertical migration (i.e., the lateral contamination of the mud spill at CAS 10-09-06) is not expected to extend past the edge of the visible mud layer.

The waste dump specific items for the first CSM include:

- The possibly affected media is soil/sediment within the excavated dump area (measuring 200 by 120 ft), and surface and subsurface soils in proximity of what are assumed to be soil piles from the excavation itself. However, discarded debris is not expected to be concealed within the soil piles; this will be confirmed with geophysical investigation. The following are descriptions of the sources and types of possible contributors to COPCs into the landfill system's generated effluent:
  - It is assumed that only rubble from construction debris generally consisting of roofing materials (e.g., asphalt shingles and tar), wood pallets, and possibly asbestos-laden insulation and flooring tiles originating from the R-MAD Facility, Beetle Building, and Warehouse were deposited in the dump.
  - Other possible contributors of wastes that were generated, or utilized, during the MX Program might have included lead-based paint, hydrocarbon waste, PCBs, hydraulic fluid, lead-acid batteries, antifreeze, and lubricating oil. However, it is uncertain if the dump received any waste generated during the MX Program.
  - The waste dump was constructed between 1976 and 1981, but the exact date is unknown. The period of operation is unknown. Because the dump was exposed for a number of years, it is uncertain whether hazardous or radiological waste materials were introduced during other periods of activity. No historical data was identified to indicate that materials were placed in the dump.
  - Radionuclide contamination is not expected at this CAS based on historical information. However, a radiological survey will be performed at this CAS because of its proximity to other nearby radioactively contaminated areas.
- No previous sampling, geophysics, or radiological surveys have been identified.

The lead bricks site-specific items for the first CSM include:

- The possibly affected media in the Lead Bricks CAS is the soil/sediment in direct contact with the bricks.

- Identification of the location of buried bricks will be confirmed with a geophysical survey.
- The sources and type of possible contributors to COPCs from this CAS identifies lead as the only COPC. Sources include fragments of the bricks and oxidized remnants of lead within the soils and trinity glass.
- The CAS is located within a posted RMA; so radionuclides, being regionally distributed, may also be associated, but they are not identified as COPCs for this investigation.
- Other surface debris that may be possible contributors of contamination that were identified in the PA are a metal bucket and a metal gas cylinder; however, their contents are unknown.

A.1.1.3.2 CSM #2 for Boxes; Pipes CAS

As noted in the previous section, the basis for developing this CSM was process knowledge and historical records. [Figure A.1-3](#) shows a generalized representation of the CSM constructed for the Boxes; Pipes CAS. This diagram shows known and suspected locations of contaminants and potential pathways for physical transport.

The CAS was named Boxes and Pipes for a network of metal pipes (manifold/header system, with six lateral pipe ports and six wooden [filter] boxes). The building's construction materials are not considered part of the CAS, nor COPCs, but can be sampled for characterization per the direction of waste management. Observed through the main header conduit pipe, it was revealed the pipes often contain some very thin, evaporated, crusty, and dust-covered residues of unknown chemical nature (IT, 2002). These residues are immobile and confined to pipe interiors; therefore, they are not considered to be a COPC to the environment and are eliminated from this CAS investigation. However, all items (except the immobile residue in the pipe interiors found within Building 1-31.2e1) may be COPC sources for contaminant release to the environment of remnant radionuclides that may have concentrated as a result of the unconfirmed experiments conducted within the building.

The following text accompanies the Boxes; Pipes CSM diagram in relating information and assumptions that are used in developing this CSM:

- **Exposure Scenario:** Site workers may be exposed to COCs through ingestion, inhalation, or dermal contact (by absorption) of COCs absorbed onto the soils outside the building.

Figure A.1-3
CAU 357 CSM #2: For Boxes; Pipes-Cut Away View of Building 1-31.2e1

- **Affected Media:** The possibly affected media in the Boxes and Pipes CAS are the surface soil and shallow subsurface soil around Building 1-31.2e1. The concrete floor and foundation are at least 20 in. thick. Soils directly beneath the building should not be impacted or affected.
- **Location of Contamination/Release Points:** The native soil interface below and adjacent to the disposed waste (just outside the front door, or behind the building below the back window) are the most likely location for soil contamination. Any contaminants migrating from these areas are expected to be in soil adjacent to vertically encountered native-soil interfaces.
- **Transport Mechanisms:** Contaminants can be expected to be found relatively close to release points (front door or back window). COPC infiltration beyond the shallow substrate is not a concern at this CAS site.
- **Preferential Pathways:** There are two preferential pathways at this CAS: (1) lateral migration across the floor and out the door or window; (2) vertical migration of COPCs from within the building and traveling down into the soil due to gravity.

- **Lateral and Vertical Extent of Contamination:** Contamination, if present, is expected to be contiguous around the buildings proximity. Concentrations are expected to decrease with distance and depth from the source. Surface migration is a biasing factor considered in the selection of sampling points.
- **Groundwater Impacts and Future Land Use:** Impacts to groundwater and future land use are not expected to be of particular concern for the same reasons identified for CSM #1.

The source and type of possible contributors to COPCs from this CAS are:

- Radionuclides, from nearby past testing and experiments conducted within Building 1-31.2e1, are identified as the COPC for this CAS. They are possibly located in, throughout, and surrounding the building's near proximity. The CAS scope of investigation is limited to localized exterior soils.

Identification of possible pipe runs (buried utilities) extending beyond the Building 1-31.2e1 will be confirmed with geophysical investigation.

A.1.2 Step 2, Identify the Decisions

This step is to identify the decision that requires new environmental data to address each CAS's potential contamination problem. [Figure A.1-4](#) is a flow chart that identifies decisions and alternative actions needed for performing an effective SAFER investigation.

A.1.2.1 Develop a Problem and Decision Statement(s)

Problem Statement: There is an insufficient amount of information to characterize the nature and extent of contamination released to these CAS sites to determine if there is a risk to human health and the environment.

Two decision statements are required for a SAFER investigation. The first decision statement is: "Is contamination present within CAU 357 at concentrations that could pose an unacceptable risk to human health and the environment?" Any contaminant detected at concentrations exceeding the corresponding PALs, defined in [Section A.1.3.2](#), will be considered a COC. The presence of a COS is defined as a concentration greater than PALs. To determine the presence of COCs, samples will be collected during the initial investigation and analyzed.

Figure A.1-4
CAU 357 Closure Decision Process

“If a COC is present, is the information available sufficient to evaluate appropriate closure?”

Sufficient information is defined as the data needs identified in this DQO to include the lateral and vertical extent of all COCs within each CAS. In other words, determine if a COC has migrated by determining extent. Samples used to resolve extent are identified as Decision II samples.

A.1.2.2 Alternative Actions to the Decision

For each decision identified in the previous section there is an alternate decision.

The alternate for Decision I is: For each CAS within CAU 357, if a COC is not present, further assessment of the CAS is not required. If a COC is present, resolve extent.

The alternate for Decision II is: For each CAS within CAU 357, if the extent of a COC is defined in both the lateral and vertical direction, further assessment of the CAS is not required. If the extent of a COC is not defined, re-evaluate site conditions, notify the decision makers (NNSA/NSO and NDEP) and decide on whether to continue with the SAFER.

A.1.3 Step 3, Identify the Inputs to the Decision

This step identifies the information needed and the information sources; determines the basis for establishing action level; the methods that meet the data requirements; and identifies sampling and analysis methods that meet the data requirements. To determine if a COC is present, each sample result (or population parameter, [Section A.1.5.1](#)) is compared to the PAL ([Section A.1.3.2](#)). If any sample result is greater than the PAL, then the CAS is advanced to Decision II activities to define the vertical and lateral extent for that analyte. This approach does not use a statistical mean/average for comparison to the PAL, but rather a point-by-point comparison to the established screening criteria to identify COCs.

A.1.3.1 Information Needs and Sources

Historical records do not always provide sufficient information regarding the source, general location, and types of potential COCs that could be expected at the various CASs in CAU 357.

Previous sampling efforts do not accurately define the contaminant concentrations greater than PALs within each CAS. In order to resolve the decision, new sample data must be collected and analyzed

following these two criteria: (1) sample in areas most likely to be contaminated, and (2) the analytical suite must be sufficient to detect any contamination in the samples. Biasing factors to support Criteria I (nature) include:

- Documented process knowledge on source and location of release
- Field observations
- Field-screening results
- Historical sample results
- Experience and data from investigations of similar sites
- Professional judgement

Additional biasing factors to support the sample collection activities and meet the first criterion include configuration of the 11 mud pits and 3 other CAS sites, field-screening methods, and pertinent field observations. The selection of biased sample locations will be based on all available biasing factors. A general list of the biasing factors to be considered during the selection of the sample location are as follows:

- Visual indicators (i.e., staining, discoloration, and/or textural discontinuities)
- Location of debris/waste
- Odor
- Elevated screening results
- Geophysical survey data
- Radiological survey data
- Physical and chemical characteristics of contaminants
- Known source and location of release
- Geologic and/or hydrologic conditions
- Process knowledge and experience at similar sites

As the sampling strategy for each CAS is developed, specific biasing factors will be described. In the absence of other biasing factors, default sampling locations are described for each CAS.

[Table A.1-1](#) lists the information needs, the source of information for each input, and the proposed methods to collect the data to resolve Decisions I and II. The last column addresses the appropriate QA/QC required for a particular data collection activity and is determined by the intended use of the resulting data in decision making.

In order to determine the extent of a COC, sample data must be collected and analyzed at locations to bound the lateral and vertical extent of COCs. For Decision II sampling, analytical suites will only

Table A.1-1
Identified Information/Data Needs to Resolve Decision
(Page 1 of 3)

Information Needs	Information Source	Collection Methods	Data Type ^a
Information needs to meet Criteria #1: If contamination is present, it will be sampled Biasing Factors in Choosing Sample Locations: (1) Source and location of release of COCs	(1) Historical records and process knowledge (i.e., CSM) provide sources of effluent stream and general location of release of COCs for both mud pits and waste dump.	Documented; therefore, no additional data collection needed.	Qualitative
(2) Configuration of mud pit areas and lead brick scatter area	(2) Lateral boundaries of mud pits known and scatter area approximated from previous site visits (Bull, 2001). Data Need: Collect geophysical data for configuration of mud pits and lead brick areas.	Perform geophysical surveys consisting of electrical imaging methods prior to sample collection.	Semiquantitative
(3) Configuration of waste dump area and Building 1-31.2e1 components	(3) General configuration of waste dump and Building 1-31.2e1 available, but inconsistencies have been identified. Data Need: Locate and verify area components.	Locate/verify configuration by conducting visual, and/or electromagnetic surveys of waste dump area to establish content locations, which may be verified by excavation with backhoe. Verify Building 1-31.2e1 configuration and locate utilities.	Qualitative
(4) Field-screening results	(4) Data Need: Possibly field screen soil for TPH at mud pits only if data from other biasing factors are insufficient to make decision on sample location. Data Need: Collect radiological survey data on surface of mud pits, waste dump, lead bricks, and boxes & pipes.	An area near proposed sample collection points (based on CSM) within the mud pit may be field screened for TPH (primary COPC) to help guide the selection of most appropriate sample to submit to laboratory (i.e., submit sample with highest field-screening result). Perform radiological survey using appropriate technology for the site to initially screen for presence of radionuclides.	Semiquantitative
(5) Field observations of surface and soil conditions	(5) Current field observations are limited due to tumbleweeds and access restrictions. Data Need: Collect field observations on surface and subsurface conditions for staining, odor, presence of debris, etc.	Conduct field observations after prefield activities are complete (e.g., removal of tumbleweeds) and during sample collection. The observations will be documented in the field and may be used in selecting biased sample locations.	Qualitative
(6) Utilities or other access problems	(6) Access problems exist at some mud pits and the waste dump area. Deactivated underground utilities may be expected in the Building 1-31.2e1. Data Need: Document all utilities and access restrictions in relation to potential sampling areas.	Complete a checklist to document locations of underground and aboveground utilities prior to intrusive work. Determine if an alternate sampling technique can access sampling location; if not, then determine alternate sampling area.	Qualitative

Table A.1-1
Identified Information/Data Needs to Resolve Decision
(Page 2 of 3)

Information Needs	Information Source	Collection Methods	Data Type ^a
Continued Criteria #1: If contamination is present, it will be sampled.	The culmination of all the biasing data collected above will aid in determining the areas most likely to be contaminated anywhere within a CAS. Data need: Collect samples from affected media in areas most likely contaminated and submit for laboratory analysis.	Mud Pits, Waste Dump, and Lead Bricks: Appropriate sampling techniques will be used to collect mud/soil cutting samples at biased locations within mud pits, waste dumps, and collect soil in contact with the lead bricks and submit for analyses. Boxes & Pipes: Appropriate techniques will be used to collect limited number of soil samples around Building 1-31.2e1 and rad swipes within and submit for analysis. Existing data documented in site background and/CSM.	Quantitative
Information Needs to Meet Criteria #2: If contamination is present, it will be detected. Types of analyses	Historical records of drilling practices provide general list of potential contaminants to be expected at mud pits. Historical records and interviews provide a general list of potential contaminants from the lead bricks area and Building 1-31.2e1. Existing sample data from the preliminary assessment conducted in 1997 on CAS 07-09-02, 07-09-04, 07-09-05, and 08-09-01 (Bordelois, 1998a, b, and c; Forsgren, 1998); TPH, VOCs, SVOCs, RCRA metals, and radionuclides were detected but levels were not above PALs, except for arsenic, which was within NTS background concentrations. Data Need: Submit newly collected samples to laboratory and analyze for full suite of COPCs to include TPH, VOCs, SVOCs, RCRA metals, PCBs, and radionuclides.	All new samples collected will be analyzed using the appropriate analytical method provided in Table 6-2 of the SAFER Plan.	Quantitative
Waste Management Requirements	IDW determined through environmental sample results. Waste will not be considered "listed" unless contrary information is discovered during the investigation.	Not applicable	Quantitative
Housekeeping Activities	The types and amount of debris for removal is generally known through visual observations. Data need: Collect samples anywhere potentially hazardous substances may have leaked or if contents are unknown (e.g., unlabeled drum). Data need: Collect verification samples for any soil or brick removal activities associated with housekeeping.	Remove debris and photodocument with notification. Submit samples to laboratory for full-suite analysis unless specific COCs can be determined.	Qualitative for photodocumentation and Quantitative for analyses

Table A.1-1
Identified Information/Data Needs to Resolve Decision
(Page 3 of 3)

Information Needs	Information Source	Collection Methods	Data Type ^a
GPS Coordinates	Data Need: Collect GPS measurements for all sample and screening locations as well as physical boundaries.	GPS measurements will be collected as points, lines, and areas in accordance with standard procedures. GPS measurements will be acquired in a manner capable of achieving horizontal accuracy of less than 50 centimeters.	Quantitative

^aThis column addresses the measurement quality assigned to all data collection activities, and is determined by the intended use of the resulting data in decision making. The levels are assigned as quantitative, semiquantitative, and qualitative.

Quantitative: Data measures the quantity or amount of a characteristic or component within the population of interest. These data require the highest level of QA/QC in collection and measurement systems because the intended use of the data is to resolve primary decisions (i.e., rejecting or accepting the null hypothesis) and/or verifying closure standards have been met. Laboratory analytical data are usually assigned as quantitative data.

Semiquantitative: Data indirectly measures the quantity or amount of a characteristic or component of interest. Inferences are drawn about the quantity or amount of a characteristic or component because a correlation has been shown to exist between the indirect measurement and the results from a quantitative measurement. The QA/QC requirements on semiquantitative collection and measurement systems are high but may not be as rigorous as a quantitative measurement system. Semiquantitative data contribute to decision making, but are not used alone to resolve primary decisions. The data are often used to guide investigations toward quantitative data collection.

Qualitative: Data identify or describe the characteristics or components of the population of interest. The QA/QC requirements are the least rigorous on data collection methods and measurement systems. Professional judgement is often used to generate qualitative data. The intended use of the data is for information purposes, to refine conceptual models, and guide investigations rather than resolve primary decisions. This measurement of quality is typically assigned to historical information and data where QA/QC may be highly variable or not known.

include those parameters that exceed PALs (i.e., COCs identified in previous samples). The data required to satisfy the information needed to determine the extent for each COC is a sample result that is below the corresponding PAL. Step-out locations will be selected based on the CSMs biasing factors, field-screening results, and initial analytical results. Biasing factors to support these informational needs may include the factors previously listed and initial analytical results.

Other information needs identified for Decision I, not directly related to determining if contamination is present above PALs, also are listed in [Table A.1-1](#) and include:

- Collect GPS coordinates of all sample locations within the delineation of boundaries of each CAS feature (e.g., mud pit, or waste dump)
- Perform housekeeping removal activities on miscellaneous debris at sites, as required
- Collect waste characterization data to meet closure requirements under NAC regulations

To resolve the decision statement(s), the necessary information for implementing a corrective action must be identified and collected.

The following information inputs are needed to support soil sample collection during Decision II activities:

- Limit COC list for laboratory analysis of Decision II samples to analytes initially detected
- Conduct field screening using methods appropriate to COCs present
- Sample using appropriate methods to bound contamination

The following information needs are identified for both close-in-place or clean closure as preferred alternatives:

- Soil samples within native soil, both vertically and laterally, to determine where the extent of contamination decreases below PALs
- Resource availability (cost analysis of preferred closure alternatives)

The following information needs are identified, if clean closure is chosen as the preferred alternative:

- Volume of material to be removed

- Potential remediation waste characteristics
- Post-removal concentrations of COCs at or below PALs

Data Types: All data to be collected are classified into one of three measurement quality categories: quantitative, semiquantitative, and qualitative. The categories for measurement quality are defined in the following paragraphs.

Quantitative Data: Quantitative data results from direct measurement of a characteristic, or component, within the population of interest. These data require the highest level of QA/QC in collection and measurement systems because the intended use of the data is to resolve the primary decision (i.e., rejecting, or accepting, the Null Hypothesis) and/or verifying closure standards have been met. Laboratory analytical data are usually assigned as quantitative data.

Semiquantitative Data: Semiquantitative data are generated from a measurement system that indirectly measures the quantity (or amount) of a characteristic (or component) of interest. Inferences are drawn about the quantity/amount of a characteristic/component because a correlation has been shown to exist between results from indirect measurement and the quantitative measurement. The QA/QC requirements on semiquantitative collection and measurement systems are high, but may not be as rigorous as a quantitative measurement system. Semiquantitative data contribute to decision making, but are not generally used alone to resolve primary decisions. The data are often used to guide investigations toward quantitative data collection.

Qualitative Data: Qualitative data identifies and/or describes the characteristics/components of the population of interest. The QA/QC requirements for qualitative data are the least rigorous on data collection methods and measurement systems. Professional judgement is often used to generate qualitative data. The intended use of the data is for information purposes, to refine conceptual models, and guide investigations rather than resolve primary decisions. This measurement of quality is typically associated with historical information and data where QA/QC may be highly variable or not known.

A.1.3.2 Determine the Basis for Preliminary Action Levels

Preliminary Action Levels will be used as a screening tool to approximate decision levels. Site-specific PALs may be generated to address site-specific contamination problems.

Industrial site workers, construction/remediation workers, and military personnel (i.e., ground troops) may be exposed to contaminants through oral ingestion, inhalation, external (radiological), or dermal contact (adsorption) of soil during disturbance of this media. Laboratory analytical results for soils will be compared to the following PALs to determine if COCs are present:

- EPA Region 9 risk-based PRGs for industrial soils (EPA, 2002).
- TPH concentrations above the TPH limit of 100 ppm per the NAC 445A.2272 (NAC, 2000b).
- Background concentrations for metals will be evaluated when natural background exceeds the PAL (i.e., arsenic). A sediment sampling effort performed by the Nevada Bureau of Mines and Geology (NBMG, 1998) provides relevant analytical data for numerous metals, including the eight RCRA metals. Statistical analysis of this data indicate background concentrations (mean plus two standard deviations) applicable to soil samples collected from the NTS for investigation of CASs (Moore, 1999).
- For COPCs without established PRGs, a similar protocol as EPA Region 9 will be used in establishing an action level.
- The PALs for radionuclides are isotope-specific and defined as the maximum concentration for that isotope found in environmental samples taken from undisturbed background locations in the vicinity of the NTS, as presented in McArthur and Miller (1989) and US Ecology and Atlan-Tech (1991). Refer to Section 2.4 of the CAU 357 SAFER Plan for establishment for radiological PALs (NNSA/NSO, 2003).

The PALs for Decision II are the same as those used in Decision I.

A.1.3.3 Potential Sampling Techniques and Appropriate Analytical Methods

As discussed in [Section A.1.3.1](#), the collection, measurement, and analytical methods will be selected so the results will be generated for all of the suspected contaminants as well as all other potential contaminants at CAU 357. This effort will include geophysical surveys, field screening, soil sampling, and laboratory analysis to determine the presence of COPCs and extent of identified COCs.

For CAU 357, site characterization sampling and analysis are the focus of the DQO process. However, waste characterization sampling and analysis has been included to support the decision-making process for waste management, and to ensure an efficient field program. Soil samples will be submitted for IDW analysis, as necessary. Specific analyses required for the disposal of IDW are identified in Section 5.0 of the SAFER Plan.

A.1.3.3.1 Geophysical Surveys

Electromagnetic surveys may be used to determine presence/lateral extent of metallic waste.

Resistivity surveys may be used to determine presence/vertical extent of CAS wastes. Geophysical surveys will follow standard procedures. Direct soil sampling will be required and implemented, if geophysical surveys are unable to conclusively determine the presence or absence of disposed waste (e.g., waste dump area's soil piles).

A.1.3.3.2 Geodetic Surveys

Geodetic surveys are performed using standard procedures for identifying soil sampling locations.

A.1.3.3.3 Field Screening

Field-screening activities may be conducted for the following analytes and/or parameters:

- TPH - A gas chromatograph, or equivalent instrument or method, will be used at all CASs because TPH is a common concern at the NTS and primary COPC for mud pits based upon process knowledge of similar sites investigated in the past.
- VOCs - A photoionization detector (PID), or equivalent instrument or method, will be used to conduct headspace analysis at all CASs because VOCs are a common concern at the NTS and have not been ruled out based upon process knowledge.
- Alpha-, Beta- and Gamma-Emitting Radionuclides - Handheld radiological survey equipment, or equivalent instrument or method, may be used at all CASs because radiation is a common concern at the NTS and has not been ruled out based upon process knowledge.
- Gamma-Emitting Radionuclides - Gamma spectroscopy, or equivalent instrument or method, provides semiquantitative results and is used at CASs where gamma-emitting radionuclides may be present. Gamma-emitting radionuclides are a concern at the NTS and cannot be ruled out based on process knowledge.
- Alpha-Emitting Radionuclides - Isotopic uranium and isotopic plutonium analysis of samples provides a quantitative result and may be used at all CASs where field-screening measurements demonstrate alpha-emitting radionuclide concentrations exceeding FSLs.

Based on the results of previous CAU investigations and common NTS practices, the aforementioned field-screening techniques will provide good semiquantitative data that can be used to guide soil sampling activities.

A.1.3.3.4 Soil Sampling

Drilling (i.e., hollow-stem auger, hand auger, direct push), excavation, or other appropriate sampling methods will be used to collect soil samples for laboratory analysis. Sample collection and handling activities will be conducted in accordance with approved procedures.

A.1.3.3.5 Analytical Program

The analytical program for CAU 357 shown in [Table A.1-2](#) has been developed based on the specific contamination information presented in Section A.1.1 of the CAU 357 SAFER Plan (NNSA/NSO, 2003). Possible CAS (dependent) chemical and radiological parameters for initial soil samples include:

- TPH (diesel- and gasoline-range organics [C_6 - C_{38}])
- Total VOCs
- Total SVOCs
- Total Metals
- PCBs
- Gamma Spectrometry
- Isotopic Plutonium
- Isotopic Uranium
- Strontium-90

Section 6.0 of the SAFER Plan provides the analytical methods and laboratory requirements (i.e., detection limits, precision, and accuracy requirements). Specific analyses required for the disposal of IDW are identified in Section 5.0 of the SAFER plan. Unless otherwise required by the results of this DQO and stated in the SAFER plan, this investigation will adhere to the Industrial Sites QAPP (NNSA/NV, 2002b).

To ensure that laboratory analyses are sufficient to detect contamination in soil samples at concentrations exceeding minimum reporting level, initial chemical and radiological parameters of interest have been selected for each CAS. Solid media (e.g., wood, concrete, lead bricks) will not be analyzed by a laboratory for chemical or radiological parameters, unless characterization is requested by waste management.

Table A.1-2
Contaminants of Potential Concern for CAU 357 CASS^a

	CASs													
CAU 357	01-99-01 Boxes; Pipes	04-26-03 Lead Bricks	07-09-02 Mud Pit	07-09-03 Mud Pit	07-09-04 Mud Pit	07-09-05 Mud Pit	08-09-01 Mud Pit	08-09-02 Mud Pit	08-09-03 Mud Pit	10-09-02 Mud Pit	10-09-04 Mud Pit	10-09-05 Mud Pit	10-09-06 Mud Pit; Stains; Material	25-15-01 Waste Dump
COPC	Organics													
Diesel TPH (C ₁₀ - C ₃₈)	--	--	X	X	X	X	X	X	X	X	X	X	X	X
Gasoline TPH (C ₆ - C ₁₀)	--	--	X	X	X	X	X	X	X	X	X	X	X	X
PCBs	--	--	X	X	X	X	X	X	X	X	X	X	X	X
SVOCs	--	--	X	X	X	X	X	X	X	X	X	X	X	X
VOCs	--	--	X	X	X	X	X	X	X	X	X	X	X	X
COPC	Inorganics													
Lead	--	X	--	--	--	--	--	--	--	--	--	--	--	--
Total Metals: to include antimony, arsenic, barium, beryllium, cobalt, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, vanadium, and zinc	--	--	X	X	X	X	X	X	X	X	X	X	X	X
COPC	Radionuclides													
Isotopic Uranium and Isotopic Plutonium	X	--	X	X	X	X	X	X	X	X	X	X	X	X
Strontium 90	X	--	X	X	X	X	X	X	X	X	X	X	X	X
Gamma Spectroscopy	X	--	X	X	X	X	X	X	X	X	X	X	X	X
Other Radionuclides	X	--	X	X	X	X	X	X	X	X	X	X	X	X

^aFor those COPCs identified that include multiple parameters, the parameters with PALs will be evaluated.

X = COPC

-- = Not a COPC analyte for this CAS

Only those COCs identified initially in Decision I above PALs will be analyzed for during Decision II. Appropriate sample collection techniques will be utilized for Decision II activities to determine the vertical and lateral extent of contamination.

A.1.4 Step 4, Define the Boundaries of the Study

This step defines the target population of interest, specifies the spatial and temporal features of that population that are pertinent for decision making, determines practical constraints on data collection, and defines the scale of decision making relevant to target populations for Decision I and Decision II activities.

A.1.4.1 Define the Target Population

First - Target populations represent locations within the CAS that contain COCs, if present.

Second - Target populations are locations within the CAS where COC concentrations are less than PALs, and that when sampled will provide sufficient data to resolve the primary problem statement ([Section A.1.2.1](#)) (i.e., $\text{COCs} < \text{PALs}$).

Two target populations have been identified for the Mud Pits. One population is the COC concentrations within mud/soil cuttings from the surface to the textural discontinuity. This equals the mud pit's excavated base. The second target population consists of COC concentrations in the native soil below and adjacent to the textural discontinuity. The first target population implies sampling in step-out locations at increased depths to determine the lateral and vertical extent.

The target population identified for the waste dump consists of COC concentrations in the native soil below and/or adjacent to the base of the pit textural discontinuity. This includes the area from the waste dump's excavated base to the waste dump feature's walls (and possibly the three soil pile's base). The objective is to identify the potential of environmental impact resulting from the contents in the dump area (and possibly within the soil piles), but not to identify the contained contents itself. If necessary, additional samples would be collected below the previous sample depth and in step-out locations to define the horizontal and vertical extent of contamination.

The target population for the lead bricks consists of identifying COC concentrations resulting from the bricks on the near-contact soil material adjacent to the bricks. Sampling will be conducted once the bricks are identified and removed. The results will be compared to natural background in soil from undisturbed, nonimpacted, background locations to provide natural background comparisons. If required, Decision II will proceed in predetermined step-out locations surrounding the scatter zone, by analysis for COCs greater than PALs.

The first target population for the boxes and pipes consists of COC concentrations for the soil and/or unconsolidated sediments within and around the general proximity (5 ft) from the building. Soil directly beneath the building is not accessible; therefore, it is not considered in the CSM as a migration pathway.

A.1.4.2 Determine the Spatial and Temporal Boundaries

The spatial boundaries for each CAS are defined as the vertical or horizontal boundaries beyond which the CSM and/or the scope of the investigation will require re-evaluation. The spatial boundaries that determine the presence of a COC are the sample locations selected to satisfy the criteria. In general, geographic boundaries are defined by the area impacted from releases attributed to each CAS. Intrusive activities are not intended to extend into boundaries of neighboring areas of environmental concern (e.g., other CASs).

The spatial boundaries that apply to each CAS are the maximum, reasonably expected, extent of potential contamination as determined by the CSM. Contamination found beyond these boundaries would indicate a potential error in the CSM and would require that the CSM be re-evaluated before the investigation would/could continue. The figures presented in [Section A.1.7.1](#) and [Section A.1.7.2](#) depict the sites and surrounding boundaries, which are essentially the CAS footprints, and illustrate the proposed sampling locations.

Each mud pit can be divided into two strata: (1) surface of mud down to the textural discontinuity (i.e., base of the pit), and (2) native material below the pit.

The lateral spatial boundaries are defined by the surrounding berm for each mud pit or by topographical slope(s). The geographic boundaries will be further expanded laterally to capture the

potential extent of contamination migration. Each mud pit CAS is defined by a 5-ft buffer zone around the berm, or pit edge, regardless if bermed or not.

The spatial boundaries for the Waste Dump are the disturbed area located in between the surrounding three soil piles and measuring approximately 200 by 120 ft. The waste dump geographic boundary remains defined as the original CAS footprint that encompasses the outside parameter of the three soil piles.

The spatial boundary for the Lead Bricks is the area of visible scatter located west of the T-4 Bunker (approximately 320 by 200 ft in area), but this boundary may be altered by the geophysical survey of the area. Numerous lead bricks have visually been identified on the ground surface.

Spatial boundary for the Boxes and Pipes CAS is defined as the inside and 5 ft beyond the outerwalls of the Building 1-31.2e1. However, the lateral spatial boundaries may be expanded on all sides of the building to capture the extent of COCs.

The spatial boundaries on all CASs have the potential to increase in size, if the extent of contamination above PALs is shown to exist beyond these boundaries defined by their respective CSM.

Temporal boundaries are those time constraints set up by weather conditions and project schedules set in the FFACO baseline. Significant temporal constraints due to weather conditions are not expected at the NTS. However, rare snow/rain events may impact sampling and surveying of radiologically contaminated soils because of the attenuating effect of moisture on alpha/beta-emitting radionuclides. Field activities will be re-scheduled around forecasted inclement weather. No temporal constraints for collecting samples are anticipated. The environmental conditions at all CASs are not expected to significantly change in the near future, as general CAS conditions have stabilized over the last 10 to 30-plus years since the systems were last used.

A.1.4.3 Identify Practical Constraints

The NTS-controlled activities may affect the ability to characterize these CAS sites. Practical constraints include underground and overhead utilities, rough terrain, access restrictions, such as: scheduling conflicts at the NTS, posted contamination area requirements (CASs 08-09-02, 08-09-03,

10-09-04, and 04-26-03), physical barriers (e.g., fences, steep slopes), and areas requiring authorized access. Underground utility surveys will be conducted at each applicable CAS prior to the start of investigative activities, to determine if utilities exist and, if so, determine the limit of spatial boundaries for intrusive activities. Deactivated and abandoned underground utilities may be expected at CAS 01-99-01. Adverse weather conditions and health and safety concerns may affect all CAS sites. No NTS area identified in this investigation is remote enough to create logistical constraints of practical concern. Certain health and safety hazards (slip/trip/fall) may exist in attempting to access all CASs, especially the mud pit and waste dump areas. No other practical constraints have been identified.

A.1.4.4 Define the Scale of Decision Making

The scales of decision making for the initial investigation are defined here as each individual CAS. The scale of decision making for Decision II is defined as a contiguous area contaminated with any COC originating from the CAS. The decision scale also allows for corrective actions appropriate to each CAS rather than the entire CAU. This approach enables individual CASs to be advanced to characterization, if necessary, rather than submitting the entire CAU to characterization.

A.1.5 Step 5, Develop a Decision Rule

This step integrates outputs from previous steps with the inputs developed in this step into a decision rule (“If...then...”) statement. This rule describes the conditions under which possible alternative actions would be chosen.

A.1.5.1 Specify the Population Parameter

The population parameter for initial data, collected from biased sample locations, is the maximum observed concentration of each COC within the target population.

The population parameter for Decision II data will be the observed concentration of each unbounded COC in any sample.

A.1.5.2 Choose an Action Level

Action levels are defined as the PALs, which are determined by EPA standards and deemed as appropriate values for CAU 357 SAFER. However, those levels of contamination are not anticipated to be reached in this investigation. Action levels may also be the unrestricted release criteria given in the *NV/YMP Radiological Control Manual* (DOE/NV, 2000).

A.1.5.3 Decision Rule

If the concentration of any COPC in a target population exceeds the PAL for that COPC during the initial investigation, then that COPC is identified as a COC and Decision II sampling will be conducted. If the Site Supervisor determines that sufficient indicators (e.g., staining) are present, Decision II sampling may be conducted before the results of the Decision I sampling are available. If all COPC concentrations are less than the corresponding PALs, then the investigation will be stopped, the decision will be: “No Further Action,” and an applicable closure report will be prepared.

If the observed population parameter of any COC in a sample exceeds the PALs during Decision II activities, additional samples will be collected to define the extent. If all observed COC population parameters are less than PALs, the decision will be that the extent of contamination has been defined in the lateral and vertical directions.

If contamination is inconsistent with the CSM, or extends beyond the spacial boundaries, work will be suspended and the investigation strategy will be re-evaluated. If contamination is consistent with the CSM and within spatial boundaries, then the decision will be to continue sampling to define extent.

A.1.6 Step 6, Specify Tolerable Limits on Decision Errors

The sampling approach for the initial investigation relies upon biased samples; therefore, statistical analysis is not appropriate. Only validated analytical results (quantitative data) will be used to determine if COC are present (Decision I), or the extent of a COC (Decision II), unless otherwise stated.

The baseline condition (i.e., null hypothesis) and alternative condition for Decision I are:

- Baseline condition - A COC is present
- Alternative condition - A COC is not present

The baseline conditions (i.e., null hypotheses) and alternative conditions for determining the extent of a COC are:

- Baseline condition - The extent of a COC has not been defined
- Alternative condition - The extent of a COC has been defined

Decisions and/or criteria have an alpha (false rejection) or beta (false acceptance) error associated with their determination (discussed in the following subsections). Since quantitative data relies upon biased samples that are individually compared to action levels, statistical evaluations and analysis of the data, such as averages and/or confidence levels, are not appropriate.

A.1.6.1 False Rejection Decision Error

The false rejection (alpha error) would mean:

- Deciding that a COC is not present, when it is (Decision I)
- Deciding that the extent of a COC has been defined, when it has not (Decision II)

In these scenarios, the consequence is the increased risk to human health and environment by not determining the full extent of contamination; thereby, implementing an inappropriate corrective action at the site that would not adequately protect against exposure to future receptors.

Two basic assumptions regarding the area of contamination contribute to minimizing the chances of making a false rejection (alpha) error. The first is that the area of contamination is contiguous, and secondly that the extent of COC concentration decreases away from the area of contamination. The criteria for bounding the extent of contamination greater than PALs requires that two consecutive lateral and vertical samples, collected and submitted to the laboratory for analysis, show analytical results below PALs. Established QA/QC and procedures help minimize false-negative lab results.

A false rejection decision error (where consequences are more severe) is controlled by meeting the following two criteria: (1) having a high degree of confidence that location selected will identify

contamination of concern if it were present anywhere within the CAS, and (2) having a 95 percent confidence level that the minimum detectable concentration for the analyses conducted will detect any COC at the PAL concentration in the samples.

This error is reduced by: (1) having a high degree of confidence that the sample locations selected will identify the extent of COCs, (2) having a high degree of confidence that analyses conducted will be sufficient to detect any COCs present in the samples, and (3) having a high degree of confidence that the data set is of sufficient quality and completeness.

To satisfy that the first criterion is met, the data and samples will be initially collected in areas that are assumed to be contaminated (worst case) by any COPCs. Next, data collection activities will identify sample areas that represent the lateral and vertical extent of contamination.

The following characteristics are considered during both decisions to accomplish the first criterion:

- Source and location of release
- Chemical nature and fate properties
- Physical transport pathways and properties
- Transport drivers

These characteristics were considered during the development of the CSM (see [Section A.1.2](#)). The biasing factors, as listed in Step 5 in [Section A.1.5.1](#), will be utilized during the investigation to further ensure that the criteria is met. To meet the second criterion, all initial samples will be analyzed for the chemical and radiological parameters listed in [Section A.1.5.3](#). Additional samples will be analyzed for COCs detected in the initial samples.

To satisfy the third criterion for extent, the entire data set, as well as individual sample results, will be assessed against the DQIs of precision, accuracy, comparability, completeness, and representativeness, as defined in the Industrial Sites QAPP (NNSA/NV, 2002b). The goal for the DQI of completeness is that 100 percent of the critical COPC results are valid for every sample. Critical COPCs are defined as those contaminants that are known, or expected to be present within a CAS. In addition, sensitivity has been included as a DQI for laboratory analyses. Site-specific DQIs are discussed in more detail in Section 6.0 of the SAFER. Strict adherence to established procedures and QA/QC protocol also protects against false negatives.

If any criteria described above are not met, then the investigation will go directly to Decision II.

A.1.6.2 False Acceptance Decision Error

The false acceptance (beta error) would mean:

- Deciding that a COC is present, when it is not
- Deciding that a COC is unbounded, when it is
- Determining that a COC has migrated beyond the spatial boundaries, when it did not

These scenarios result in increased costs for unneeded characterization and unnecessary corrective action costs.

The false acceptance decision error is controlled by protecting against false-positive analytical results. False-positive analytical results are typically attributed to laboratory errors and/or sampling/handling errors. Quality assurance/quality control samples such as field blanks, trip blanks, laboratory control samples, and method blanks are used to determine if a false-positive analytical result may have occurred. The blanks should minimize the risk of a false-positive analytical result. Other measures include proper decontamination of sampling equipment and using certified clean sampling equipment and containers to avoid cross contamination, and knowing the history of similar CAS sites with low beta errors.

A.1.6.3 Quality Assurance/Quality Control

Radiological survey instruments and field-screening equipment will be calibrated and checked in accordance with the manufacturer's instructions or approved procedures.

Quality control samples will be collected as required by the IS QAPP (NNSA/NV, 2002b) and in accordance with established procedures.

The required QC samples include:

- Trip blanks (1 per sample cooler containing VOC environmental samples)
- Equipment blanks (1 per sampling event for each type of decontamination procedure)
- Source blanks (1 per water source used for dust suppression)

- Field duplicates (1 per 20 mud pit samples - CASs are grouped collectively, or 1 per CAS - excluding mud pits - if less than 20 environmental samples are collected for that CAS)
- Field blanks (1 per 20 environmental samples)
- Matrix spike/matrix spike duplicate (1 per 20 environmental samples, or 1 per CAS per matrix if less than 20 collected, or as required by radioanalytical methods)

Additional QC samples may be submitted based on site conditions.

Quality data indicators of precision, accuracy, comparability, completeness, and representativeness are defined in the Industrial Sites QAPP (NNSA/NV, 2002b). Site-specific data quality indicators are discussed in more detail in Section 6.0 of the SAFER Plan.

A.1.7 Step 7, Optimize the Design for Obtaining Data

This section presents an overview of the resource-effective sampling and analysis design to obtain data that satisfy the project DQOs developed in the previous six steps.

If field data generated during Decision I activities strongly indicate that contaminants are above decision levels, Decision II data may be collected without the support of Decision I analytical results (i.e., heavy concentrations of hydrocarbon staining and odor). Contaminants determined not to be present in Decision I samples may be eliminated from Decision II analyses. Contaminants can also be eliminated from Decision II analyses based on previous knowledge.

The objective of the investigation strategy of a SAFER Plan is to determine whether COCs are present and, if so, define the horizontal and vertical extent above PALs. Geophysical surveys and biased intrusive soil sampling for field screening and laboratory analysis will be conducted at CAU 357 during the investigation, as necessary. The biased locations will be selected by the Site Supervisor as field data are generated by geophysics and field-screening results. Additional samples may be collected for waste management as needed for characterization and disposal purposes. The Site Supervisor has the discretion to modify the biased locations based on biasing factors or analytical results, but only if the modified locations meet the decision needs and criteria stipulated in [Section A.1.2](#), which provides the general approach for obtaining the information necessary to resolve the decisions. A ROTC will be submitted to document justification to change a sample

location, as required. It is important to note that the target populations to be investigated may be different than those to determine the presence of COCs.

The initial sampling strategy targets worst-case contamination by sampling the soils at the mud pits, the waste dump, beneath the lead bricks and surrounding the Building 1-31.2e1 locations assume to have the highest potential for contamination. Field-screening will be instituted to assist in providing an additional semiquantitative screening measurement of COPC concentrations when other biasing data are insufficient to locate the area most likely to be contaminated. These field-screening results will help guide the selection of the most appropriate sampling location for collection of laboratory samples. Potential field-screening methods with the respective field-screening levels are presented below:

- TPH screening levels are established at 100 ppm, using field GC or other appropriate field test kit. Soil will be field screened for TPH only at the mud pit/disposal and waste dump sites.
- The radiation (alpha/beta) screening level is defined as the mean surficial-background activity level plus two times the standard deviation of that mean.
- VOC headspace screening levels are established at 20 ppm or 2.5 times background, whichever is greater, using a PID.

Drilling, direct-push, excavation, or other appropriate soil collection techniques will be used to collect soil samples for laboratory analysis. Biased locations for these activities are determined based on the biasing factors listed in [Section A.1.3.2](#). The proposed sample locations are discussed in the following sections; however, process knowledge indicates that CAU 357 contamination, if any, is confined to within the spatial boundaries of the individual CASs. The initial analytical results will be used to confirm the presence or absence of COPCs and if the concentrations exceed PALs. If COCs are located within a CAS, that CAS will be further assessed in a Decision II investigation. The COPCs determined not to be present will be eliminated from further consideration during a Decision II characterization effort.

Activities at these CASs will consist of confirming the location of each sample point proposed within the CAS, and sample collection for laboratory analysis for the target population of COPCs (i.e., mud pits - within mud/soil cuttings from the surface to the textural [base of pit] discontinuity). The sampling strategy consists of biased sampling.

Efforts will consist of additional sampling at sites where COCs were confirmed to be present above PALs during initial sampling activities, and that the extent of the COC has not been defined. The analytical results will be used to determine where the extent of contamination has decreased below PALs. Only the COCs determined to be present will be analyzed in samples collected to determine the extent of contamination. It is important to note that the target population(s) to be investigated may be different from those in the initial investigation. The target populations are discussed in the following sections.

Environmental soil samples may be field screened to guide sample collection activities, to assist in waste management decisions, and to provide health and safety information provided that the COCs identified have an appropriate screening method. Field-screening methods and field-screening levels will be established prior to the start of sampling activities.

Step-out locations at each CAS will be selected based on the outer boundary sample locations where COCs were detected, and other biasing factors listed in [Section A.1.3.2](#). If the biasing factors indicate COCs extend beyond the initial Decision II sample locations, further step-out locations may be necessary. In general, samples submitted for off-site laboratory analysis would be those that define the lateral and vertical extent of COCs.

Some of the CASs have overgrown vegetation (e.g., tumble weeds) and miscellaneous debris that will need to be removed and properly disposed during site preparation activities. Details will be provided to the NTS Performance-Based Management Contractor (i.e., housekeeping) prior to the start of the investigation.

The sampling strategies outlined below will ensure that the lateral and vertical extent of contamination has been adequately located, identified, and quantified. Site preparation activities for each CAS are documented below in the relevant section.

A.1.7.1 CSM #1: For Mud Pit CASs 07-09-02, 07-09-03, 07-09-04, 07-09-05, 08-09-01, 08-09-02, 08-09-03, 10-09-02, 10-09-04, 10-09-05, 10-09-06, Waste Dump CAS 25-15-01, and Lead Bricks CAS 04-26-03

Several site preparation activities and preliminary investigation techniques must be completed prior to the initiation of sampling activities for the CASs. These activities include the following:

- Removing tumbleweeds from within each pit/or location, if needed
- Inspecting the surface features of each pit for staining, debris, etc.
- Constructing access ramps into pits, where required, for backhoe and personnel entrance
- Conducting geophysical surveys within each pit/dump and across the brick scatter area
- Conducting radiological surveys within each pit/dump and across the brick scatter area

Sampling locations will be selected in areas most likely to be contaminated based on the conceptual model and other biasing factors outlined in Step 3 (e.g., field screening, geophysics). Exact sample locations will be determined in the field by the Site Supervisor. [Figure A.1-1](#) provides a three-dimensional plan map view of the general CSM. [Figure A.1-2](#) illustrates the cross-sectional view of a typical mud pit and illustrates idealized potential sample locations. [Figure A.1-2](#) may be applicable to the other CASs in the CSM.

Geophysical surveys will be performed within the spatial boundaries of each mud pit to facilitate the selection of biased sample locations, determine the configuration of each pit (e.g., construction of the base), and identify if debris is present within the pits. The surveys may be extended several feet past the boundaries to gather data on contrasting soil characteristics. The geophysical surveys will consist of electrical imaging methods to measure the subsurface resistivity and identify the transition between the clay characteristics of mud and the sands/gravels of native soil, if possible; and identify any metallic debris that may be buried within the mud pit.

A sample target area will be identified based on geophysical anomalies and field observations. Surface samples will be collected from biased locations within the center of each identified anomaly and/or from the topographic high and low points within the pit for TPH screening samples. The locations with the highest TPH field-screening results will then be considered, along with other biasing data collected, in selecting the sample point(s) for surface and subsurface sample collection and laboratory submittal. Field screening for TPH may be conducted at initial areas targeted for biased sampling to further enhance the selection of sample areas most likely to be contaminated. For the initial Decision step of data collection in the Mud Pits, Waste Dump, and Lead Bricks CASs, biased samples will be collected within the mud/soil cuttings from locations determined by the criteria discussed in [Table A.1-1](#).

Mud Pit CAS-Specific Sampling Information for CASs: 07-09-02, 07-09-03, 07-09-04, 07-09-05, 08-09-01, 08-09-02, 08-09-03, 10-09-02, 10-09-04, 10-09-05, and 10-09-06

Each mud pit will be sampled at a minimum of two biased locations within the defined spatial boundaries (Figure A.1-5 to Figure A.1-15). Each sample location will consist of two discrete samples, unless the configuration and depth of mud at a given location precludes two separate depths; in which case, only one sample will be collected at that particular location. One sample will be collected at the surface (0 to 6 in.) within the mud/soil cuttings matrix, while the second sample will consist of an approximately 6-in. interval comprised of mud and native soil at the textural (base of pit) discontinuity. Collecting both mud and native soil at this discontinuity ensures that contamination, if present, will be detected whether it is bound in mud matrix or leached into the nearby native soil. Additional material adjacent to the initial sample location may be collected to ensure sufficient volume is submitted to satisfy analytical requirements.

The mud/grout spills of CASs 10-09-04 and 10-09-06 may be sampled during the initial activities. The mud characteristics at these locations can be assumed consistent with the results of the return mud pit and suction mud pit associated with these CASs. Therefore, the analytical results from these two muds pits will be utilized to determine if any further characterization strategies are necessary at the locations during the Decision II efforts.

Subsurface soil sampling may be conducted to determine the extent of COC above PALs. Hand auguring, backhoe excavation, or direct-push will be the primary techniques of investigation for these CASs. If the vertical extent of contamination is deeper than the limits of these techniques, then an appropriate drilling technique will be used.

To investigate the vertical and lateral extent of contamination where COCs above PALs were detected in Decision I sample locations, subsurface samples will be collected below the textural discontinuity (vertical) and adjacent to those locations (lateral) at depth/step-out locations selected by the Site Supervisor up to approximately 15 ft beyond the outer boundary of the Decision I sample locations. Each sample will be submitted to the laboratory for analysis for only the COCs identified in Decision I. Initial sample locations are tentatively planned for the topographic highs and lows, areas of concentrated mud flow discharge/in-flow, and any stain areas within the physical boundaries of the mud pits with depth/step-out locations to be determined by site conditions.

Figure A.1-5
CAU 357, CAS 07-09-02, Mud Pit

Figure A.1-6
CAU 357, CAS 07-09-03, Mud Pit

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Figure A.1-8
CAU 357, CAS 07-09-05, Mud Pit

Figure A.1-9
CAU 357, CAS 08-09-01, Mud Pit

Figure A.1-10
CAU 357, CAS 08-09-02, Mud Pit

Figure A.1-11
CAU 357, CAS 08-09-03, Mud Pit

Figure A.1-12
CAU 357, CAS 10-09-02, Mud Pit

Figure A.1-13
CAU 357, CAS 10-09-04, Mud Pit

Figure A.1-14
CAU 357, CAS 10-09-05, Mud Pit

Figure A.1-15
CAU 357, CAS 10-09-06, Mud Pit; Stains; Material

Vertical and lateral extent of contamination will be bounded by laboratory analytical results that show concentrations of COCs below PALs. If any of the step-out analytical results indicate COCs are still present, additional depth step-out locations (vertically and/or laterally) will be sampled until it can be demonstrated that COC concentrations below PALs have been achieved. If results indicate the extent of contamination extends beyond 50 ft of the spatial boundaries, the conceptual model has failed and the investigation will need rescoping.

Housekeeping activities have been identified for each of the mud pit CASs and involve the removal of various wood and metal scraps located within the spatial boundaries of the mud pits. The remaining surface debris that requires content identification will be sampled and then removed through housekeeping operations. Any additional housekeeping activities identified during the course of the investigation will be documented and implemented.

Waste Dump CAS-Specific Sampling Information: CAS 25-15-01

The sampling strategy for the waste dump will be similar to activities outlined in the mud pit section, and as modified from the Corrective Action Investigation Plan for CAU 5: Landfills, Nevada Test Site, Nevada (NNSA/NV, 2002a). Initial activities at this CAS will consist of confirming the configuration of system components, as defined by the geophysical survey, and sample collection within or nearby the geophysically identified anomalies of the following target population: soil below and/or adjacent to the backfill/native soil interface within the zone of original excavation. The sample will be collected as near an anomaly's maximum concentration within the disturbed area where excavation and burial of debris may have occurred as field conditions allow. The surface (backfill) soils above the debris will not be sampled because it is native soil used for cover and retards contaminant release to the environment beyond the CAS.

As noted above, soil from the three soil piles base will also be sampled, if it is determined geophysically that debris resides within them. To confirm a geophysically determined anomaly, each soils pile may be breached with a backhoe to visually determine the presence or absence of debris. If debris is present, soil beneath the debris at the soil/native soil interface may be collected using a hand auger and analyzed. If no debris is located in the piles, the soil piles may be either left-in-place or leveled to provide a cap of native soil across the waste dump area, dependent on waste management and NDEP directive. Either way, the corrective action chosen will be close-in-place.

Site preparation for the initial investigation activities will consist of removing the few tumbleweeds from the waste dump area, inspecting the surface features of the disturbed area, conducting a radiological walkover survey, and through extrusive (geophysics) and/or intrusive (e.g., backhoe, hand-auger, or direct-push) investigations. The investigators will locate and verify the backfilled configuration (and content presence) of the landfilled area and soil piles (anticipate clean, native-soil within these areas).

Sampling will not be conducted for characterization of the waste dump's debris contents except for waste management purposes, as appropriate. Samples of soil beneath the debris (if physically recoverable), or as near as field conditions allow, will be collected and analyzed. A sediment/soil sample will be collected from the topographic lowest point(s) that coincide beneath each geophysically determined anomalous high and/or elevated PID/flame-ionization detector field-screening level within the excavated area as determined by Site Supervisor observations. Field screening for TPH will be conducted at initial areas targeted for biased sampling to provide additional biasing information regarding sample areas likely to be contaminated. The locations with the highest TPH field-screening results will then be considered, along with other biasing data collected, in selecting the sample point(s) for surface and subsurface sample collection and laboratory submittal.

A minimum of four biased-locations, as identified above, will be sampled within and around the waste dump area. These biased locations will target areas most likely to have been contaminated by the disposal process and provide a "worst-case" scenario and/or at least define extent. The exact locations within each sampling area will be selected by the Site Supervisor based upon site characteristics determined through field observations. For the waste dump, samples will potentially consist of soil collected within the first 12 in. of soil immediately beneath the native soil base. If the presence of debris is confirmed within the soil piles, only one sample per pile will be collected and analyzed from as near the center of the pile as physically possible within the first 12 in. of soil beneath the native soil base. [Figure A.1-16](#) shows the potential sample locations based on current site conditions.

Soil sampling may be conducted simultaneously with activities to determine the lateral extent of COC. Geographic access limitations of this site and unknown debris within the back-filled area may hamper backhoe excavation or direct-push techniques feasibility to determine lateral extent within the

Figure A.1-16
CAU 357, CAS 25-15-01, Waste Dump

excavated walls of the waste dump. Therefore, to define extent, sampling will be conducted beyond the excavated parameter. However, during the investigation to define the vertical and lateral extent of contamination, every attempt will be made to collect samples from below the textural discontinuity at each determined sample location. Each sample will be submitted to the laboratory for analysis for the COCs initially identified. The lateral and vertical extent of contamination will be bounded by laboratory analytical results that show concentrations of COCs below PALs. If any of the step-out analytical results indicate COCs are still present, additional depth step-out locations will be sampled until it can be demonstrated that COC concentrations below PALs have been achieved. If bedrock refusal is encountered before the extent has been determined, the investigation will stop and the conceptual model re-evaluated.

All necessary closure activities associated with the waste dump will be considered initial investigation activities. Following delineating the extent, surface/exposed debris will either be removed or left in-place, as determined by waste management. Backfilling, if determined by waste management, would proceed according to NAC regulations (NAC, 2000a). Hauling off of debris determined hazardous or radiological (unexpected) will also be considered initial investigation activities.

To facilitate the closure of the waste dump under NAC requirements (NAC, 2000a), samples will be initially collected in soils adjacent to and/or beneath the most contaminated debris piles identified, which may or may not conform to geophysical anomaly highs, to confirm releases have not occurred from these structures. The waste dump's actual dimensions, types of construction debris that may be identified, and estimated volume of refuse landfilled will be documented for closure purposes.

The objective of the SAFER investigation at this CAS is not to identify contents of the debris disposed in the dump, but to identify impact to the environment at this point in time resulting from the debris' burial. The strata sampled within the waste dump will be determined by the depth to native soil/rock interface, which is assumed to be less than 7 ft. Surface cover material will not be sampled.

Lead Bricks CAS-Specific Sampling Information: CAS 04-26-03

Activities at this CAS will consist of determining the configuration of the scattered lead brick within the area and sample collection of the target population (i.e., the COC concentrations within surface

soils in contact or near contact with the located bricks). The sampling strategy for CAS 04-26-03 consists of identifying and sampling three biased surface locations within the brick scatter area based on brick cluster patterns and identified geophysical and radiological anomalies. Approximately 50 lead bricks have been identified and are exposed on the ground surface. All bricks, and several other surface debris items initially identified are within and around the area of the scattered lead brick and will be removed from the area for future housekeeping activities and prior to the initial investigation should it be deemed necessary.

Site preparation activities are minimal at this CAS and should consist primarily of health and safety precautions for accessing the area, which is within a known Underground Radiological Material Area. Access into the area is restricted to personnel working under an approved radiological work permit (RWP). A health and safety item to consider for field activity planning is that no more than 2 bricks should be carried at a time to the disposal bin by any one person, as each brick weighs 26 pounds. Site Supervisors should remind personnel performing the task of removal to bend at the knees and not with the back. [Figure A.1-17](#) shows the potential sample locations based on known current site conditions.

The observable bricks will be collected and placed on a sturdy pallet for waste management. The location from which they were removed will be pin-flagged. Once identified bricks are out of the CAS area, a geophysical sweep of the area will be conducted to identify buried brick locations, and those bricks will be similarly collected and locations flagged. Each brick location will then be revisited, and one full shovel of soil will be collected and drummed for a waste management composite characterization and disposal; whereby, remediation should be complete. Three biased-soil samples will be collected from across the scatter area from former brick locations. The samples will be collected below scoop depth across the scatter area for COC analysis. Sampling activities may be conducted in all areas prescribing brick removal at the discretion of the Site Supervisor based on field observations (e.g., soil staining).

Miscellaneous debris including wood and metal scraps and other objects (i.e., bucket, gas cylinder), and barbed-wire and assorted cabling will be removed as housekeeping activities, if required. The metal objects may contain unknown material. The contents of the metal bucket and gas cylinder (if present and unknown) may be drummed and sampled for waste management purposes.

Figure A.1-17
CAU 357, CAS 04-26-03, Lead Bricks

If initial analytical results indicate COCs above PALs, increased depth and step-out sampling will be collected. Additional soil sampling will consist of collecting and drumming an additional scoop (or two) from each of the pin-flagged locations (defines vertical extent) and four additional sample locations around and outside the scatter area and toward the CAS boundary to define lateral extent. This information, combined with analytical results from the background locations compared to the drummed soil results should provide confirmatory abatement evidence, as required, for a clean closure corrective action report. All flags will be retrieved for waste management upon this sampling's completion.

A.1.7.2 CSM #2 for CAS 01-99-01, Boxes; Pipes

Site preparation activities are minimal at the Boxes and Pipes CAS and should consist primarily of health and safety precautions for accessing the area, which is within a known former Nuclear Testing Area. Access into the area may be restricted to personnel working under an approved RWP.

Decision I activities at this CAS will be primarily limited to the outside of Building 1-31.2e1, which houses all the boxes and pipes identified in the CAS. The flooring material of Building 1-31.2e1 is a 2-ft thick concrete slab and foundation. It is impractical to sample soils beneath the slab. Sampling below the 2-ft pad is not necessary because there is not a CSM-identified migration pathway for contaminant release. Decision I activities will consist of determining the locations for sample collection of the target population (i.e., the COC concentrations within surface soils in contact or near contact with Building 1-31.2e1). The sampling strategy for CAS 01-99-01 consists of identifying and sampling two biased-soil locations around Building 1-31.2e1's proximal area. One sample will be collected from near the front doorway and one will be collected from beneath the back window.

[Figure A.1-18](#) illustrates the two proposed sample locations which are located nearest to release pathways from the building that contaminants generated or concentrated within could use to exit the building and impact the environment. Also, a geophysical review of the area (lateral geographic boundary is 15 ft beyond the walls of Building 1-31.2e1) will be conducted to encompass and identify all the potentially unidentified buried utility run(s) that may have serviced the building.

Activities to be performed inside the building will include a visual inspection for contamination (staining), monitoring with a PID for organics, and a radiological survey. If there is a PID detection and/or the radiological survey identifies a radiological contamination above FSL, samples will be

collected. No inside samples will be collected if there is not indication of contamination. Care will be taken not to disturb items contained within the building.

Initially, the surface soil locations selected proximal to and surrounding Building 1-31.2e1 will be sampled for COPC analysis from the native soil interface, assumed to be 0 to 6 in. Decision II soil sampling is not anticipated since the scope of work for this CAS has been identified as COC identification and characterization of soils outside the building only. Decision I data should provide information adequate to support a clean closure corrective action report.

Items within and around Building 1-31.2e1 may require housekeeping removal activities following the investigation, per waste management direction. Miscellaneous debris including wood pieces (and boxes), metal scraps, and objects may be removed as housekeeping items, if required.

Figure A.1-18
CAU 357, CAS 01-99-01, Boxes; Pipes - "Building 1-31.2e1"

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Appendix B

Closure Certification for CAU 357

B.1.0 Closure Certification

The following section document closure activities completed for CAU 357 at CAS 08-09-01. Closure activities (i.e., excavation) were not completed at the other CASs and are not discussed in this Appendix.

B.1.1 CAS 08-09-01 Closure Activities

A total of 15 Decision II soil samples were collected to characterize the lateral and vertical extent of TPH-DRO originally detected above the PAL in soil sample 357E006. The soil sample analytical results obtained from this sample indicated a concentration of TPH-DRO of 6,200 mg/kg. The soil sample 357E006 was a surface sample collected from 0.0 to 0.5 ft bgs at location E04. The Decision II soil samples 357E020 and 357E021 were collected from location E04 at depths of 5.5 to 6.0 ft bgs and 8.0 to 8.5 ft bgs, respectively. These soil samples were collected using a backhoe to verify the vertical extent of TPH-DRO at location E04. The soil sample analytical results obtained from this sample did not detect TPH-DRO above the FAL. The Decision II soil samples 357E010/357E011, 357E019, 357E013 and 357E018 were collected from locations E05, E06, E07, and E08, respectively. These soil samples were collected to verify the lateral extent of TPH-DRO in the soil at location E04. The soil sample analytical results obtained from these soil samples did not detect TPH-DRO above the FAL. The soil sample analytical results from this CAS are summarized on [Table D.1-17](#) and provided in [Appendix D](#).

The analytical results obtained from the Decision II verification samples were used to guide the remediation of TPH-DRO contaminated soil at location E04. The soil was remediated by excavation using a backhoe. The soil was contained in 22 55-gallon drums (357E02 through 357E023) and managed as investigation derived waste. The analytical results of the verification samples and the implemented remediation strategy supports the clean closure of this CAS.

Appendix C

As-Built Documentation for CAU 357

C.1.0 As-Built Documentation

The as-built drawings are [Figure 2-1](#) through [Figure 2-16](#) in [Section 2.1](#) through [Section 2.1.14](#).

Appendix D

**Sample Analytical Results
for CAU 357**

Analytical Tables for CAS 07-09-02

Table D.1-1
Soil Sample Results for Metals Detected Above Minimum Reporting Limits at CAS 07-09-02, Mud Pit

Sample Location	Sample Number	Depth (in. bgs)	Contaminants of Potential Concern (mg/kg)									
			Arsenic	Barium	Beryllium	Chromium	Cobalt	Copper	Lead	Nickel	Vanadium	Zinc
Final Action Levels			23 ^a	67,000 ^b	1,900 ^b	450 ^b	1,900 ^b	41,000 ^b	750 ^b	20,000 ^b	7,200 ^b	100,000 ^b
A01	357A001	0 - 6	2.7	200	0.82	3.2	1.5	3.3	8.8	2.6	8.3	54
	357A002	12 - 18	4.2	130	0.56	2.7	1.8	3.1	10	3.1	12	23
A02	357A003	0 - 6	5.8	400	1.2 (J)	12	2.2	7.2 (J)	22	7.7	8.9	66
	357A004	8 - 14	3.1	160	0.73 (J)	3.9	1.7	4 (J)	11	3.7	9	44
	357A005	8 - 14	3.4	160	0.73 (J)	3.6	1.8	4 (J)	14	4.1	8.4	44
	357A006	15 - 20	3.6	130	0.59 (J)	4.7	2.2	3.8 (J)	8.4	4.4	12	34
A03	357A007	0 - 6	4.6	250	0.65 (J)	11	1.5	5.1 (J)	13	4.6	6.3	46
	357A008	10 - 14	2.7	150	0.7 (J)	3.6	1.3	3.2 (J)	10	2.7	5.6	61
	357A009	15 - 20	4.2	130	0.53 (J)	4.2	2	3.8 (J)	9.9	4.1	10	33

^aBased on the background concentrations for metals. Background is considered the mean plus two times the standard deviation for sediment samples collected by the Nevada Bureau of Mines and Geology throughout the Nevada Test and Training Range (NBMG, 1998; Moore, 1999).

^bBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2002)

in. bgs = Inches below ground surface

mg/kg = Milligrams per kilogram

B = Analyte found in both sample and associated blank.

J = Estimated value. Qualifier added to laboratory data; record accepted. Serial dilution %D outside control limits. Matrix effects may exist.

Table D.1-2
Soil Sample Results for Gamma-Emitting Radionuclides
Detected Above Minimum Detectable Concentrations at CAS 07-09-02, Mud Pit

			Contaminants of Potential Concern (pCi/g)											
Sample Location	Sample Number	Depth (in. bgs)	Actinium-228		Bismuth-214		Lead-212		Lead-214		Thallium-208		Thorium-234	
Final Action Levels			5 ^a	15 ^a	5 ^a	15 ^a	5 ^a	15 ^a	5 ^a	15 ^a	5 ^a	15 ^a	63.2 ^b	
	Depth bgs (cm)		<15	>15	<15	>15	<15	>15	<15	>15	<15	>15		
A01	357A001	0 - 6	2.12 (G)	NA	1.48 (G, J)	NA	2.91 (J) ^c	NA	1.47 (G, J)	NA	0.77 (G)	NA	--	
	357A002	12 - 18	NA	1.49 (G)	NA	1.04 (G, J)	NA	1.72 (J) ^c	NA	1.16 (G, J)	NA	0.49 (G)	--	
	357A003	0 - 6	2.37 (G)	NA	1.45 (G, J)	NA	2.84 (J) ^c	NA	1.85 (G, J)	NA	0.73 (G)	NA	4.4 (G, TI)	
A02	357A004	8 - 14	NA	2.18 (G)	NA	1.27 (G, J)	NA	2.4 (J) ^c	NA	1.39 (G, J)	NA	0.67 (G)	--	
	357A005	8 - 14	NA	1.48 (G)	NA	1.11 (G, J)	NA	1.87 (J) ^c	NA	1.03 (G, J)	NA	0.74 (G)	--	
	357A006	15 - 20	NA	1.4 (G)	NA	1.19 (G, J)	NA	2.1 (J) ^c	NA	1.12 (G, J)	NA	0.58 (G)	--	
A03	357A007	0 - 6	1.14 (G)	NA	0.76 (G, J)	NA	1.5 (J) ^c	NA	0.85 (G, J)	NA	0.38 (G)	NA	--	
	357A008	10 - 14	NA	1.97 (G)	NA	0.82 (G, J)	NA	2.11 (J) ^c	NA	1.24 (G, J)	NA	0.62 (G)	--	
	357A009	15 - 20	NA	1.57 (G)	NA	1.2 (G, J)	NA	1.79 (J) ^c	NA	1.1 (G, J)	NA	0.55 (G)	--	

^aTaken from the generic guidelines for residual concentrations of actinium-228, bismuth-214, lead-212, lead-214, thallium-208, and thorium-234, as found in Chapter IV of DOE Order 5400.5, Change 2, "Radiation Protection of the Public and Environment." (DOE, 1993). The PALs for these isotopes is specified as 5 pCi/g averaged over the first 15 cm of soil and 15 pCi/g for deeper soils (DOE, 1993). For purposes of this document, 15 cm is assumed to be equivalent to 0.5 ft (6 inches); therefore, 5 pCi/g represents the PALs for these radionuclides in the surface soil (0 to 0.5 ft depth).

^bTaken from the construction, commercial, industrial land use scenario in Table 2.1 of the NCRP Report No. 129, *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 15-mrem/yr. dose.

^cQualifier added to laboratory data; record accepted. Sample does not meet counting geometry requirements.

in. bgs = Inches below ground surface

cm = Centimeter

pCi/g = Picocuries per gram

-- = Not detected above minimum reporting limits

> = Greater than

< = Less than

G = Sample density differs by more than 15% of laboratory control sample density.

J = Estimated value.

TI = Nuclide identification is tentative.

NA = Not applicable

Table D.1-3
Soil Samples Results for Isotopes Detected
Above Minimum Detectable Concentrations at CAS 07-09-02, Mud Pit

Sample Location	Sample Number	Depth (in. bgs)	Contaminants of Potential Concern (pCi/g)			
			Plutonium-239	Uranium-234	Uranium-235	Uranium-238
Final Action Levels			7.62 ^a	85.9 ^a	10.5 ^a	63.2 ^a
A01	357A001	0 - 6	--	1.54	0.085	1.51
	357A002	12 - 18	--	1.14	--	1.08
A02	357A003	0 - 6	0.059 (J)	1.73	0.104	2
	357A004	8 - 14	--	1.2	0.079	1.26
	357A005	8 - 14	--	1.24	--	1.12
	357A006	15 - 20	--	1.06	0.058	1.08
A03	357A007	0 - 6	0.058 (J)	1.28	0.085	1.11
	357A008	10 - 14	--	1.01	0.051	1.03
	357A009	15 - 20	--	1.17	--	1.02

^aTaken from the construction, commercial, industrial land use scenario in Table 2.1 of the NCRP Report No. 129 *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 15-mrem/yr dose.

in. bgs = Inches below ground surface

pCi/g = Picocuries per gram

J = Estimated value. Qualifier added to laboratory data; record accepted. Duplicate normalized difference outside control limits.

-- = Not detected above minimum reporting limits

Analytical Tables for CAS 07-09-03

Table D.1-4
Soil Sample Results for Total VOCs Detected Above
Minimum Reporting Limits at CAS 07-09-03, Mud Pit

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (µg/kg)
			Methylene Chloride
Final Action Levels			21,000 ^a
B09	357B018	0.0 - 0.5	22
	357B019	1.0 - 1.5	11
B10	357B020	0.0 - 0.5	5.9
	357B021	1.0 - 1.5	7
B11	357B022	0.0 - 0.5	7.8
	357B023	0.0 - 0.5	6.4
	357B024	1.5 - 2.0	11
	357B025	2.5 - 3.0	22
B12	357B026	0.0 - 0.5	9.5
	357B027	1.5 - 2.0	17
	357B028	2.5 - 3.0	15
B13	357B029	0.0 - 0.5	15
	357B030	1.0 - 1.5	13
B14	357B031	0.0 - 0.5	15
	357B032	1.0 - 1.5	12
B15	357B033	0.0 - 0.5	16

^aBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2002)

ft bgs = Feet below ground surface

µg/kg = Micrograms per kilogram

Table D.1-5
Soil Sample Results for TPH-DRO Detected Above
Minimum Reporting Limits at CAS 07-09-03, Mud Pit

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (mg/kg)
			Diesel Range Organics
Final Action Levels			100 ^a
B01	357B001	0.0 - 0.5	51 (M)

^aBased on *Nevada Administrative Code*; Contamination of soil: Establishment of action levels (NAC, 2002)

ft bgs = Feet below ground surface

mg/kg = Milligrams per kilogram

M = A pattern resembling motor oil was detected.

Table D.1-6
Soil Sample Results for Metals Detected Above
Minimum Reporting Limits at CAS 07-09-03, Mud Pit
(Page 1 of 3)

			Contaminants of Potential Concern (mg/kg)										
Sample Location	Sample Number	Depth (ft bgs)	Antimony	Arsenic	Barium	Beryllium	Chromium	Cobalt	Copper	Lead	Nickel	Vanadium	Zinc
Final Action Levels			410 ^a	23 ^b	67,000 ^a	1,900 ^a	450 ^a	1,900 ^a	41,000 ^a	750 ^a	20,000 ^a	7,200 ^a	100,000 ^a
B01	357B001	0.0 - 0.5	--	4.7	150	1.4 (J) ^c	4.7	2.4	7.9	14	4.9	9.5	40
	357B002	1.5 - 2.0	--	6.9	160	1.3 (J) ^c	12	7	17	14	14	22	60
	357B003	3.0 - 3.5	--	5.1	130	0.9 (J) ^c	6.5	4.1	8.9	10	8.2	14	38
B02	357B004	0.0 - 0.5	--	4.4	250	1.3 (J) ^c	3.3	2	4.1	14	5.4	8.8	40
	357B005	1.0 - 1.5	--	3.9	150	1.3 (J) ^c	2.8	1.8	3.6	13	3.2	8.5	35
	357B006	1.0 - 1.5	--	4.7	160	1.3 (J) ^c	3.3	1.9	3.8	13	3.6	9.1	36
B03	357B007	2.5 - 3.0	--	4.6	180	0.92 (J) ^c	7.7	4.5	10	10	9	16	41
	357B008	0.0 - 0.5	--	3.5	240	0.99 (J) ^c	3.2	1.8	3.4	13	5.5	7.6	32
	357B009	1.0 - 1.5	--	4	170	0.66 (J) ^c	5.1	3.2	6.1	8.8	6.1	13	28
B04	357B010	0.0 - 0.5	--	4.2	390	1.4 (J) ^e	3.3	1.8	3.9	16	5.6	7.9	41
	357B011	1.0 - 1.5	--	4.2	160	0.79 (J) ^c	5.7	3.5	7.7	8.7	6.8	13	33
B05	357B012	0.0 - 0.5	--	3.2	130	1.1 (J) ^c	2.3	1.7	2.8	10	2.9	8.3	27
	357B013	1.0 - 1.5	--	3.6	170	0.69 (J) ^c	4.9	3	5.7	8.3	5.7	12	28
B06	357B014	0.0 - 0.5	--	3.8	87	0.59 (J) ^c	3.7	2.2	5	6.3	4.8	10	24
B07	357B015	0.0 - 0.5	--	4.3	150	0.77 (J) ^c	5.9	3.5	7.8	11	7	14	36
B08	357B016	0.0 - 0.5	--	5.6	150	1.1 (J) ^c	9.3	5.5	13	13	11	18	50
	357B017	1.0 - 1.5	--	5.7	130	0.85 (J) ^c	7.6	4.5	10	9.5	8.8	17	40

Table D.1-6
Soil Sample Results for Metals Detected Above
Minimum Reporting Limits at CAS 07-09-03, Mud Pit
(Page 2 of 3)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (mg/kg)										
			Antimony	Arsenic	Barium	Beryllium	Chromium	Cobalt	Copper	Lead	Nickel	Vanadium	Zinc
Final Action Levels			410 ^a	23 ^b	67,000 ^a	1,900 ^a	450 ^a	1,900 ^a	41,000 ^a	750 ^a	20,000 ^a	7,200 ^a	100,000 ^a
B09	357B018	0.0 - 0.5	--	5.6	150	1.3 (J) ^c	8.7	4.4	12	15 (J) ^d	9.6	16	51 (J) ^c
	357B019	1.0 - 1.5	--	5	150	0.83 (J) ^c	7.3	4.5	9.8	12 (J) ^d	8.4	16	36 (J) ^c
B10	357B020	0.0 - 0.5	--	4.5	160	1.6 (J) ^c	6	2.6	7.3	17 (J) ^d	6	9.7	48 (J) ^c
	357B021	1.0 - 1.5	--	4.8	200	0.77 (J) ^c	6.2	3.9	8.6	14 (J) ^d	7.4	15	33 (J) ^c
B11	357B022	0.0 - 0.5	--	3.7	180	1.1 (J) ^c	4	2	4.8	12 (J) ^d	4.2	8.9	30 (J) ^c
	357B023	0.0 - 0.5	--	3.9	190	1.2 (J) ^c	4.2	2.1	5.2	12 (J) ^d	4.3	9.4	32 (J) ^c
	357B024	1.5 - 2.0	--	6.3	160	1.1 (J) ^c	11	6	15	12 (J) ^d	12	21	51 (J) ^c
	357B025	2.5 - 3.0	--	5	150	0.83 (J) ^c	7.8	4.4	9.4	9.5 (J) ^d	8.5	21	42 (J) ^c
B12	357B026	0.0 - 0.5	--	3.9	140	1.2 (J) ^c	4.1	2.5	5.6	12 (J) ^d	4.6	11	34 (J) ^c
	357B027	1.5 - 2.0	--	5.8	150	0.94 (J) ^c	8.8	5.1	12	10 (J) ^d	10	18	43 (J) ^c
	357B028	2.5 - 3.0	--	4.4	140	0.65 (J) ^c	5.3	3.4	7.1	9.5 (J) ^d	6.4	14	29 (J) ^c
B13	357B029	0.0 - 0.5	--	4	130	0.8 (J) ^c	5.1	2.9	6.7	12 (J) ^d	5.6	14	32 (J) ^c
	357B030	1.0 - 1.5	--	4.2	140	0.7 (J) ^c	5.9	3.5	7.2	9.4 (J) ^d	6.8	15	31 (J) ^c

Table D.1-6
Soil Sample Results for Metals Detected Above
Minimum Reporting Limits at CAS 07-09-03, Mud Pit
(Page 3 of 3)

			Contaminants of Potential Concern (mg/kg)										
Sample Location	Sample Number	Depth (ft bgs)	Antimony	Arsenic	Barium	Beryllium	Chromium	Cobalt	Copper	Lead	Nickel	Vanadium	Zinc
Final Action Levels			410 ^a	23 ^b	67,000 ^a	1,900 ^a	450 ^a	1,900 ^a	41,000 ^a	750 ^a	20,000 ^a	7,200 ^a	100,000 ^a
B14	357B031	0.0 - 0.5	--	5.2	150	1 (J) ^c	8.3	4.5	11	12 (J) ^d	9.4	17	45 (J) ^c
	357B032	1.0 - 1.5	--	4.6	150	0.82 (J) ^c	6.8	4.2	9.4	12 (J) ^d	8.3	16	37 (J) ^c
B15	357B033	0.0 - 0.5	2 (J) ^f	2.7	160	0.7 (J) ^c	2.7	2.2	2.8	9.9 (J) ^d	3	8.8	24 (J) ^c

^aBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2002)

^bBased on the background concentrations for metals. Background is considered the mean plus two times the standard deviation for sediment samples collected by the Nevada Bureau of Mines and Geology throughout the Nevada Test and Training Range (NBMG, 1998; Moore, 1999).

^cQualifier added to laboratory data; record accepted. Serial dilution %D outside control limits. Matrix effects may exist.

^dQualifier added to laboratory data; record accepted. Duplicate precision analysis (relative percent difference) outside control limits.

^eQualifier added to laboratory data; record accepted. Serial dilution %D outside control limits. Matrix spike recovery outside control limits.

^fQualifier added to laboratory data; record accepted. Matrix spike recovery outside control limits.

ft bgs = Feet below ground surface

mg/kg = Milligrams per kilogram

B = Analyte found in both sample and associated blank.

J = Estimated value.

Table D.1-7
Soil Sample Results for Gamma-Emitting Radionuclides
Detected Above Minimum Detectable Concentrations at CAS 07-09-03, Mud Pit
(Page 1 of 3)

			Contaminants of Potential Concern (pCi/g)													
Sample Location	Sample Number	Depth (ft bgs)	Actinium-228		Americium-241	Bismuth-212		Bismuth-214		Cesium-137	Lead-212		Lead-214		Thallium-208	
Final Action Levels			5 ^a	15 ^a	7.62 ^d	5 ^a	15 ^a	5 ^a	15 ^a	7.3 ^b	5 ^a	15 ^a	5 ^a	15 ^a	5 ^a	15 ^a
Depth bgs (cm)			<15	>15		<15	>15	<15	>15		<15	>15	<15	>15	<15	>15
B01	357B001	0.0 - 0.5	2.22 (G)	NA	--	--	NA	1.58 (G, J)	NA	--	3 (J) ^c	NA	1.74 (G, J)	NA	0.82 (G)	NA
	357B002	1.5 - 2.0	NA	2.1 (G)	--	NA	--	NA	1.45 (G, J)	--	NA	2.15 (J) ^c	NA	1.33 (G, J)	NA	0.64 (G)
	357B003	3.0 - 3.5	NA	1.61 (G)	--	NA	--	NA	1.1 (G, J)	--	NA	2.06 (J) ^c	NA	1.27 (G, J)	NA	0.49 (G)
	357B004	0.0 - 0.5	2.36 (G)	NA	--	--	NA	1.4 (G, J)	NA	--	2.83 (J) ^c	NA	1.68 (G, J)	NA	0.75 (G)	NA
B02	357B005	1.0 - 1.5	NA	2.71 (G)	--	NA	--	NA	1.58 (G, J)	--	NA	2.65 (J) ^c	NA	1.4 (G, J)	NA	0.99 (G)
	357B006	1.0 - 1.5	NA	2.74 (G)	--	NA	--	NA	1.48 (G, J)	--	NA	2.78 (J) ^c	NA	1.53 (G, J)	NA	0.87 (G)
	357B007	2.5 - 3.0	NA	1.56 (G)	--	NA	--	NA	1.12 (G, J)	--	NA	2.03 (J) ^c	NA	1.06 (G, J)	NA	0.59 (G)
	357B008	0.0 - 0.5	2.13 (G)	NA	--	--	NA	1.25 (G, J)	NA	--	2.52 (J) ^c	NA	1.48 (G, J)	NA	0.74 (G)	NA
B03	357B009	1.0 - 1.5	NA	1.57 (G)	--	NA	--	NA	1.2 (G, J)	--	NA	1.79 (J) ^c	NA	1.12 (G, J)	NA	0.62 (G)
	357B010	0.0 - 0.5	2.54 (G)	NA	--	--	NA	1.69 (G, J)	NA	--	2.84 (J) ^c	NA	1.74 (G, J)	NA	0.76 (G)	NA
B04	357B011	1.0 - 1.5	NA	1.82 (G)	--	NA	--	NA	1.05 (G, J)	--	NA	1.95 (J) ^c	NA	1.05 (G, J)	NA	0.42 (G)
	357B012	0.0 - 0.5	1.98 (G)	NA	--	--	NA	1.38 (G, J)	NA	--	1.86 (J) ^c	NA	1.31 (G, J)	NA	0.74 (G)	NA
B05	357B013	1.0 - 1.5	NA	1.25 (G)	--	NA	--	NA	0.94 (G, J)	--	NA	1.86 (J) ^c	NA	1.1 (G, J)	NA	0.41 (G)
	357B014	0.0 - 0.5	1.2 (G)	NA	--	--	NA	1.04 (G, J)	NA	--	1.78 (J) ^c	NA	1.16 (G, J)	NA	0.51 (G)	NA
B06	357B015	0.0 - 0.5	1.52 (G)	NA	1.81 (J)	--	NA	1.25 (G, J)	NA	1.16 (G)	2.07 (J) ^c	NA	1.73 (G, J)	NA	0.47 (G)	NA
	357B034	1.0 - 1.5	NA	1.55 (G)	--	NA	--	NA	0.78 (G, J)	--	NA	1.78 (J)	NA	1.11 (G, J)	NA	0.63 (G)
B07	357B016	0.0 - 0.5	1.65 (G)	NA	--	--	NA	1.36 (G, J)	NA	0.264 (G, LT)	2.02 (J) ^c	NA	1.46 (G, J)	NA	0.54 (G)	NA
	357B017	1.0 - 1.5	NA	1.58 (G)	--	NA	--	NA	1.13 (G, J)	--	NA	1.95 (J) ^c	NA	1.06 (G, J)	NA	0.53 (G)

Table D.1-7
Soil Sample Results for Gamma-Emitting Radionuclides
Detected Above Minimum Detectable Concentrations at CAS 07-09-03, Mud Pit
(Page 2 of 3)

			Contaminants of Potential Concern (pCi/g)													
Sample Location	Sample Number	Depth (ft bgs)	Actinium-228		Americium-241	Bismuth-212		Bismuth-214		Cesium-137	Lead-212		Lead-214		Thallium-208	
Final Action Levels			5 ^a	15 ^a	7.62 ^d	5 ^a	15 ^a	5 ^a	15 ^a	7.3 ^b	5 ^a	15 ^a	5 ^a	15 ^a	5 ^a	15 ^a
Depth bgs (cm)			<15	>15		<15	>15	<15	>15		<15	>15	<15	>15	<15	>15
B09	357B018	0.0 - 0.5	1.54 (G)	NA	0.58 (J) ^c	--	NA	1.27 (G, J)	NA	--	2.41 (J) ^c	NA	1.4 (G, J)	NA	0.67 (G)	NA
	357B019	1.0 - 1.5	NA	1.51 (G)	--	NA	--	NA	1.18 (G, J)	--	NA	1.93 (J) ^c	NA	1.33 (G, J)	NA	0.5 (G)
B10	357B020	0.0 - 0.5	2.74 (G)	NA	--	--	NA	1.22 (G, J)	NA	0.38 (G, LT)	3.28 (J) ^c	NA	1.65 (G, J)	NA	0.79 (G)	NA
	357B021	1.0 - 1.5	NA	1.82 (G)	--	NA	--	NA	1.12 (G, J)	--	NA	1.77 (J) ^c	NA	1.24 (G, J)	NA	0.54 (G)
B11	357B022	0.0 - 0.5	2.26 (G)	NA	--	--	NA	1.46 (G, J)	NA	--	2.78 (J) ^c	NA	1.51 (G, J)	NA	0.75 (G)	NA
	357B023	0.0 - 0.5	2.01 (G)	NA	--	3.6 (G)	NA	1.56 (G, J)	NA	--	2.57 (J) ^c	NA	1.78 (G, J)	NA	0.66 (G)	NA
	357B024	1.5 - 2.0	NA	1.71 (G)	--	NA	--	NA	1.43 (G, J)	--	NA	2.21 (J) ^c	NA	1.41 (G, J)	NA	0.62 (G)
	357B025	2.5 - 3.0	NA	1.57	--	NA	--	NA	1.18 (J)	--	NA	1.76	NA	0.95 (J)	NA	0.66
B12	357B026	0.0 - 0.5	2.54 (G)	NA	--	--	NA	1.28 (G, J)	NA	--	2.76 (J) ^c	NA	1.88 (G, J)	NA	0.63 (G)	NA
	357B027	1.5 - 2.0	NA	1.84 (G)	--	NA	--	NA	0.96 (G, J)	--	NA	1.99 (J) ^c	NA	1.33 (G, J)	NA	0.59 (G)
	357B028	2.5 - 3.0	NA	1.31	--	NA	--	NA	1 (J)	--	NA	1.73	NA	1.02 (J)	NA	0.47
B13	357B029	0.0 - 0.5	1.81 (G)	NA	0.73 (J) ^c	--	NA	1.29 (G, J)	NA	0.57 (G)	2.16 (J) ^c	NA	1.42 (G, J)	NA	0.61 (G)	NA
	357B030	1.0 - 1.5	NA	1.42	--	NA	--	NA	0.92 (J)	--	NA	1.7	NA	1.03 (J)	NA	0.524
B14	357B031	0.0 - 0.5	1.84 (G)	NA	--	--	NA	1.17 (G, J)	NA	0.67 (G)	2.24 (J) ^c	NA	1.78 (G, J)	NA	0.65 (G)	NA
	357B032	1.0 - 1.5	NA	1.61 (G)	--	NA	--	NA	0.91 (G, J)	--	NA	1.61 (J) ^c	NA	1.02 (G, J)	NA	0.67 (G)
B15	357B033	0.0 - 0.5	1.73 (G)	NA	--	2.02 (G)	NA	1.12 (G, J)	NA	0.201 (G, LT)	1.98 (J) ^c	NA	1.12 (G, J)	NA	0.59 (G)	NA

Table D.1-7
Soil Sample Results for Gamma-Emitting Radionuclides
Detected Above Minimum Detectable Concentrations at CAS 07-09-03, Mud Pit
(Page 3 of 3)

			Contaminants of Potential Concern (pCi/g)													
Sample Location	Sample Number	Depth (ft bgs)	Actinium-228		Americium-241	Bismuth-212		Bismuth-214		Cesium-137	Lead-212		Lead-214		Thallium-208	
Final Action Levels			5 ^a	15 ^a	7.62 ^q	5 ^a	15 ^a	5 ^a	15 ^a	7.3 ^b	5 ^a	15 ^a	5 ^a	15 ^a	5 ^a	15 ^a
Depth bgs (cm)			<15	>15		<15	>15	<15	>15		<15	>15	<15	>15	<15	>15
B16	357B035	0.0 - 0.5	1.72 (G)	NA	--	--	NA	1.2 (G, J)	NA	1.38 (G)	1.87 (J) ^c	NA	1.55 (G, J)	NA	0.55 (G)	NA
B17	357B036	0.0 - 0.5	1.42 (G)	NA	--	--	NA	1.09 (G, J)	NA	--	1.93 (J) ^c	NA	0.92 (G, J)	NA	0.54 (G)	NA
B18	357B037	0.0 - 0.5	1.74 (G)	NA	--	--	NA	1.12 (G, J)	NA	--	1.78 (J) ^c	NA	1.44 (G, J)	NA	0.58 (G)	NA

^aTaken from the generic guidelines for residual concentrations of actinium-228, bismuth-212, bismuth-214, lead-212, and thallium-208, as found in Chapter IV of DOE Order 5400.5, Change 2, "Radiation Protection of the Public and Environment." (DOE, 1993). The PALs for these isotopes is specified as 5 pCi/g averaged over the first 15 cm of soil and 15 pCi/g for deeper soils (DOE, 1993). For purposes of this document, 15 cm is assumed to be equivalent to 0.5 ft (6 inches); therefore, 5 pCi/g represents the PALs for these radionuclides in the surface soil (0 to 0.5 ft depth).

^bTaken from the construction, commercial, industrial land use scenario in Table 2.1 of the NCRP Report No. 129, *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 15-mrem/yr. dose.

^cQualifier added to laboratory data; record accepted. Sample does not meet counting geometry requirements.

ft bgs = Feet below ground surface

cm = Centimeter

pCi/g = Picocuries per gram

-- = Not detected above minimum reporting limits

> = Greater than

< = Less than

G = Sample density differs by more than 15% of laboratory control sample density.

J = Estimated value.

LT = Result is less than the requested minimum detectable concentration, greater than the sample specific minimum detectable concentration.

NA = Not applicable

Table D.1-8
Soil Sample Results for Isotopes Detected Above
Minimum Detectable Concentrations at CAS 07-09-03, Mud Pit
(Page 1 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (pCi/g)				
			Plutonium-238	Plutonium-239	Uranium-234	Uranium-235	Uranium-238
Final Action Levels			7.78 ^a	7.62 ^a	85.9 ^a	10.5 ^a	63.2 ^a
B01	357B001	0.0 - 0.5	--	2.8	1.36	0.057	1.47
	357B002	1.5 - 2.0	--	0.315	1.09	0.069	1.07
	357B003	3.0 - 3.5	--	--	1.02	0.077	0.94
B02	357B004	0.0 - 0.5	--	0.39	1.64	0.077	1.58
	357B005	1.0 - 1.5	--	0.57	1.35	0.063	1.29
	357B006	1.0 - 1.5	0.097	4.89	1.3	0.052	1.3
	357B007	2.5 - 3.0	--	0.036 (LT)	0.92	--	0.89
B03	357B008	0.0 - 0.5	--	0.47	1.21	0.061	1.19
	357B009	1.0 - 1.5	--	--	0.81	--	0.86
B04	357B010	0.0 - 0.5	--	0.132	1.58	0.066	1.77
	357B011	1.0 - 1.5	--	0.111	0.86	0.053	0.96
B05	357B012	0.0 - 0.5	--	0.243	1.27	0.073	1.31
	357B013	1.0 - 1.5	0.041 (LT)	1.26	0.95	--	0.84
B06	357B014	0.0 - 0.5	0.126	0.63	1.16	0.051	1.07
B07	357B015	0.0 - 0.5	0.48	14.4	0.94	0.057	0.86
	357B034	1.0 - 1.5	--	0.208	--	--	--
B08	357B016	0.0 - 0.5	--	1.39	1.07	0.055	1.04
	357B017	1.0 - 1.5	--	--	0.85	0.057	0.93
B09	357B018	0.0 - 0.5	0.14 (J)	7.3 (J)	1.13	--	1.26
	357B019	1.0 - 1.5	-0.002 (J)	0.007 (J)	1	0.077	0.91
B10	357B020	0.0 - 0.5	0.02 (J)	2.57 (J)	1.29	0.091	1.45
	357B021	1.0 - 1.5	0.104 (J)	0.371 (J)	0.98	--	0.97
B11	357B022	0.0 - 0.5	0.032 (J)	0.97 (J)	1.39	0.082	1.5
	357B023	0.0 - 0.5	0.033 (J)	0.88 (J)	1.46	0.08	1.46
	357B024	1.5 - 2.0	-0.003 (J)	0.02 (J)	0.91	0.071	1
	357B025	2.5 - 3.0	-0.001 (J)	0.012 (J)	0.98	0.065	0.86

Table D.1-8
Soil Sample Results for Isotopes Detected Above
Minimum Detectable Concentrations at CAS 07-09-03, Mud Pit
(Page 2 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (pCi/g)				
			Plutonium-238	Plutonium-239	Uranium-234	Uranium-235	Uranium-238
Final Action Levels			7.78 ^a	7.62 ^a	85.9 ^a	10.5 ^a	63.2 ^a
B12	357B026	0.0 - 0.5	0.156 (J)	5.4 (J)	1.54	--	1.44
	357B027	1.5 - 2.0	0.004 (J)	0.168 (J)	0.98	0.059	0.98
	357B028	2.5 - 3.0	0.014 (J)	0.021 (J)	0.81	0.037 (LT)	0.93
B13	357B029	0.0 - 0.5	0.221 (J)	4.63 (J)	1.28	0.063	1.03
	357B030	1.0 - 1.5	0.006 (J)	0.051 (J)	0.87	--	0.83
B14	357B031	0.0 - 0.5	0.218 (J)	6.7 (J)	1.07	0.084	1.15
	357B032	1.0 - 1.5	0.002 (J)	0.068 (J)	0.82	--	0.88
B15	357B033	0.0 - 0.5	0.064 (J)	0.63 (J)	1.25	0.065	1.07
B16	357B035	0.0 - 0.5	0.43	7.1	--	--	--
B17	357B036	0.0 - 0.5	--	1.62	--	--	--
B18	357B037	0.0 - 0.5	--	0.303	--	--	--

^aTaken from the construction, commercial, industrial land use scenario in Table 2.1 of the NCRP Report No. 129 *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 15-mrem/yr dose.

ft bgs = Feet below ground surface

pCi/g = Picocuries per gram

J = Estimated value. Qualifier added to laboratory data; record accepted. Duplicate normalized difference outside control limits.

LT = Result is less than the requested minimum detectable concentration, greater than the sample specific minimum detectable concentration.

-- = Not detected above minimum reporting limits

Analytical Tables for CAS 07-09-04

Table D.1-9
Soil Sample Results for Metals Detected
Above Minimum Reporting Limits at CAS 07-09-04, Mud Pit

Sample Location		Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (mg/kg)										
Final Action Levels														
		Arsenic	Barium	Beryllium	Chromium	Cobalt	Copper	Lead	Nickel	Selenium	Vanadium	Zinc		
		23 ^a	67,000 ^b	1,900 ^b	450 ^b	1,900 ^b	41,000 ^b	750 ^b	20,000 ^b	5,100 ^b	7,200 ^b	100,000 ^b		
C01	357C001	0.0 - 0.5	120	0.73 (J)	4.9	3.1	6.1	9.6 (J)	5.4	--	13	28		
	357C002	1.0 - 1.5	120	0.66 (J)	4	2.8	3.8	9.4 (J)	4.2	--	12	24		
	357C003	2.0 - 2.5	110	--	2.8	1.9	2.4	7.4 (J)	2.7	--	9.5	18		
C02	357C004	0.0 - 0.5	130	0.77 (J)	4.1	2.6	5.6	9 (J)	4.4	--	12	26		
	357C005	1.0 - 1.5	100	--	3.3	2.7	3.3	9.6 (J)	3.7	--	10	25		
	357C006	1.0 - 1.5	97	0.56 (J)	3.3	2.4	3.6	7.7 (J)	3.6	--	11	22		
C03	357C007	0.0 - 0.5	180	0.89 (J)	4.9	2.8	5.6	15 (J)	4.4	0.59	15	30		
	357C008	1.0 - 1.5	110	--	5.7	3.4	2.3	12 (J)	3.3	--	35	49		
C04	357C009	0.0 - 0.5	110	0.54 (J)	3.6	2.3	4	6.9 (J)	3.9	--	12	22		
	357C010	1.0 - 1.5	100	0.63 (J)	4.1	2.8	4.7	8.1 (J)	4.4	--	12	26		
C05	357C011	0.0 - 0.5	93	--	2	1.7	2.3	5.9 (J)	2.4	--	6.2	15		
	357C012	1.0 - 1.5	84	--	3.5	2.8	3.3	6.4 (J)	3.4	--	13	24		

^aBased on the background concentrations for metals. Background is considered the mean plus two times the standard deviation for sediment samples collected by the Nevada Bureau of Mines and Geology throughout the Nevada Test and Training Range (NBMG, 1998; Moore, 1999).

^bBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2002)

ft bgs = Feet below ground surface

mg/kg = Milligrams per kilogram

J = Estimated value. Qualifier added to laboratory data; record accepted. Serial dilution %D outside control limits. Matrix effects may exist.

Table D.1-10
Soil Sample Results for Gamma-Emitting Radionuclides
Detected Above Minimum Detectable Concentrations at CAS 07-09-04, Mud Pit

			Contaminants of Potential Concern (pCi/g)															
Sample Location	Sample Number	Depth (ft bgs)	Actinium-228			Bismuth-214			Lead-212			Lead-214			Thallium-208			Thorium-234
Final Action Levels			5 ^a	15 ^a	5 ^a	15 ^a	5 ^a	15 ^a	5 ^a	15 ^a	5 ^a	15 ^a	5 ^a	15 ^a	5 ^a	15 ^a	63.2 ^b	
Depth bgs (cm)			<15	>15	<15	>15	<15	>15	<15	>15	<15	>15	<15	>15	<15	>15		
C01	357C001	0.0 - 0.5	1.35 (G)	NA	0.93 (G,J)	NA	1.75 (J) ^c	NA	1.12 (G,J)	NA	0.54 (G)	NA	0.54 (G)	NA	NA	NA	—	
	357C002	1.0 - 1.5	NA	1.84 (G)	NA	1.06 (G,J)	NA	2.12 (J) ^c	NA	1.23 (G,J)	NA	1.23 (G,J)	NA	0.66 (G)	0.66 (G)	2.44 (G)		
	357C003	2.0 - 2.5	NA	1.62 (G)	NA	0.78 (G,J)	NA	1.99 (J) ^c	NA	0.99 (G,J)	NA	0.99 (G,J)	NA	0.5 (G)	0.5 (G)	—		
C02	357C004	0.0 - 0.5	1.67 (G)	NA	1.31 (G,J)	NA	1.95 (J) ^c	NA	1.23 (G,J)	NA	0.72 (G)	NA	0.72 (G)	NA	NA	NA	—	
	357C005	1.0 - 1.5	NA	1.64 (G)	NA	0.71 (G,J)	NA	1.72 (J) ^c	NA	0.99 (G,J)	NA	0.99 (G,J)	NA	0.518 (G)	0.518 (G)	—		
	357C006	1.0 - 1.5	NA	1.56 (G)	NA	0.78 (G,J)	NA	1.71 (J) ^c	NA	1.08 (G,J)	NA	1.08 (G,J)	NA	0.63 (G)	0.63 (G)	—		
C03	357C007	0.0 - 0.5	1.87 (G)	NA	1.03 (G,J)	NA	1.98 (J) ^c	NA	1.3 (G,J)	NA	0.59 (G)	NA	0.59 (G)	NA	NA	NA	—	
	357C008	1.0 - 1.5	NA	1.63 (G)	NA	0.89 (G,J)	NA	1.83 (J) ^c	NA	0.92 (G,J)	NA	0.92 (G,J)	NA	0.7 (G)	0.7 (G)	—		
C04	357C009	0.0 - 0.5	1.89 (G)	NA	1.11 (G,J)	NA	2.16 (J) ^c	NA	1.11 (G,J)	NA	0.56 (G)	NA	0.56 (G)	NA	NA	NA	—	
	357C010	1.0 - 1.5	NA	1.85 (G)	NA	0.95 (G,J)	NA	1.86 (J) ^c	NA	1.12 (G,J)	NA	1.12 (G,J)	NA	0.62 (G)	0.62 (G)	—		
C05	357C011	0.0 - 0.5	1.38 (G)	NA	0.84 (G,J)	NA	1.63 (J) ^c	NA	0.88 (G,J)	NA	0.388 (G)	NA	0.388 (G)	NA	NA	NA	—	
	357C012	1.0 - 1.5	NA	1.57 (G)	NA	0.87 (G,J)	NA	2.02 (J) ^c	NA	1.14 (G,J)	NA	1.14 (G,J)	NA	0.48 (G)	0.48 (G)	—		

^aTaken from the generic guidelines for residual concentrations of actinium-228, bismuth-214, lead-212, thallium-208, and thorium-234, as found in Chapter IV of DOE Order 5400.5, Change 2, "Radiation Protection of the Public and Environment." (DOE, 1993). The PALs for these isotopes is specified as 5 pCi/g averaged over the first 15 cm of soil and 15 pCi/g for deeper soils (DOE, 1993). For purposes of this document, 15 cm is assumed to be equivalent to 0.5 ft (6 inches); therefore, 5 pCi/g represents the PALs for these radionuclides in the surface soil (0 to 0.5 ft depth).

^bTaken from the construction, commercial, industrial land use scenario in Table 2.1 of the NCRP Report No. 129, *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 15-mrem/yr. dose.

^cQualifier added to laboratory data; record accepted. Sample does not meet counting geometry requirements.

ft bgs = Feet below ground surface

cm = Centimeter

pCi/g = Picocuries per gram

-- = Not detected above minimum reporting limits

> = Greater than

< = Less than

G = Sample density differs by more than 15% of laboratory control sample density.

J = Estimated value.

NA = Not applicable

Table D.1-11
Soil Sample Results for Isotopes Detected
Above Minimum Detectable Concentrations at CAS 07-09-04, Mud Pit

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (pCi/g)				
			Plutonium-238	Plutonium-239	Uranium-234	Uranium-235	Uranium-238
Final Action Levels			7.78 ^a	7.62 ^a	85.9 ^a	10.5 ^a	63.2 ^a
C01	357C001	0.0 - 0.5	--	0.6 (J)	1	0.098	0.93
	357C002	1.0 - 1.5	--	0.008 (J)	1.02	--	0.99
	357C003	2.0 - 2.5	--	0.004 (J)	0.97	0.085	0.97
C02	357C004	0.0 - 0.5	--	0.154 (J)	1.1	0.051	1.11
	357C005	1.0 - 1.5	--	0 (J)	0.88	0.056	0.94
	357C006	1.0 - 1.5	--	0.003 (J)	1.01	0.062	0.99
C03	357C007	0.0 - 0.5	--	0.204 (J)	1.14	0.094	1.09
	357C008	1.0 - 1.5	--	0.003 (J)	0.77	0.045 (LT)	0.82
C04	357C009	0.0 - 0.5	--	3.79 (J)	1.15	--	1.02
	357C010	1.0 - 1.5	--	0.016 (J)	1.03	--	1.02
C05	357C011	0.0 - 0.5	0.145	1.23 (J)	0.89	--	1.02
	357C012	1.0 - 1.5	--	0.44 (J)	0.91	--	0.91

^aTaken from the construction, commercial, industrial land use scenario in Table 2.1 of the NCRP Report No. 129 *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 15-mrem/yr dose.

ft bgs = Feet below ground surface

pCi/g = Picocuries per gram

J = Estimated value. Qualifier added to laboratory data; record accepted. Duplicate precision analysis (relative percent difference) outside control limits.

LT = Result is less than the requested minimum detectable concentration, greater than the sample specific minimum detectable concentration.

-- = Not detected above minimum reporting limits

Analytical Tables for CAS 07-09-05

Table D.1-12
Soil Sample Results for Total VOCs Detected
Above Minimum Reporting Limits at CAS 07-09-05, Mud Pit

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (µg/kg)
			Tetrachloroethene
Final Action Levels			3,400 ^a
D02	357D004	0.0 - 0.5	24

^aBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2002)

ft bgs = Feet below ground surface

µg/kg = Micrograms per kilogram

Table D.1-13
Soil Sample Results for Metals Detected Above
Minimum Reporting Limits at CAS 07-09-05, Mud Pit

			Contaminants of Potential Concern (mg/kg)									
Sample Location	Sample Number	Depth (ft bgs)	Arsenic	Barium	Beryllium	Chromium	Cobalt	Copper	Lead	Nickel	Vanadium	Zinc
Final Action Levels			23 ^a	67,000 ^b	1,900 ^b	450 ^b	1,900 ^b	41,000 ^b	750 ^b	20,000 ^b	7,200 ^b	100,000 ^b
D01	357D001	0.0 - 0.5	8.2	110	0.97	10	4	15	120	8.2	8.5	23
	357D002	1.0 - 1.5	5.3	120	1	4.8	1.9	4.9	41	2.6	9.2	23
	357D003	1.5 - 2.0	3.8	190	0.62	4.4	2.8	4.8	28	4	16	30
D02	357D004	0.0 - 0.5	6.2	170	1.2	3.8	1.4	4.2	25	--	7.3	25
	357D005	1.0 - 1.5	4.5	130	1.1	3.7	1.3	4	19	--	7.5	22
	357D006	1.5 - 2.0	3.7	120	0.56	3.9	2.5	3.6	16	2.9	13	25
D03	357D007	0.0 - 0.5	7	120	1.4	10	2	9.8	49	4.4	7.6	32
	357D008	1.0 - 1.5	2.7	95	--	2.6	1.9	2.6	17	2.3	11	21

^aBased on the background concentrations for metals. Background is considered the mean plus two times the standard deviation for sediment samples collected by the Nevada Bureau of Mines and Geology throughout the Nevada Test and Training Range (NBMG, 1998; Moore, 1999).

^bBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2002)

ft bgs = Feet below ground surface
mg/kg = Milligrams per kilogram

Table D.1-14
Soil Sample Results for Gamma-Emitting Radionuclides
Detected Above Minimum Detectable Concentrations at CAS 07-09-05, Mud Pit

			Contaminants of Potential Concern (pCi/g)											
Sample Location	Sample Number	Depth (ft bgs)	Actinium-228		Bismuth-212		Bismuth-214		Lead-212		Lead-214		Thallium-208	
Final Action Levels			5 ^a	15 ^a	5 ^a	15 ^a	5 ^a	15 ^a	5 ^a	15 ^a	5 ^a	15 ^a	5 ^a	15 ^a
Depth bgs (cm)			<15	>15	<15	>15	<15	>15	<15	>15	<15	>15	<15	>15
D01	357D001	0.0 - 0.5	--	NA	--	NA	0.81 (G, J)	NA	1.36 (J) ^b	NA	0.97 (G, J)	NA	0.38 (G)	NA
	357D002	1.0 - 1.5	NA	1.76 (G)	NA	--	NA	0.92 (G, J)	NA	2.56 (J) ^b	NA	1.4 (G, J)	NA	0.67 (G)
	357D003	1.5 - 2.0	NA	1.75 (G)	NA	2.29 (G)	NA	0.85 (G, J)	NA	1.94 (J) ^b	NA	0.95 (G, J)	NA	0.66 (G)
D02	357D004	0.0 - 0.5	1.92 (G)	NA	--	NA	0.89 (G, J)	NA	2.07 (J) ^b	NA	1.05 (G, J)	NA	0.62 (G)	NA
	357D005	1.0 - 1.5	NA	2.36 (G)	NA	--	NA	1.16 (G, J)	NA	2.67 (J) ^b	NA	1.36 (G, J)	NA	0.73 (G)
	357D006	1.5 - 2.0	NA	1.88 (G)	NA	--	NA	0.85 (G, J)	NA	1.88 (J) ^b	NA	1.21 (G, J)	NA	0.61 (G)
D03	357D007	0.0 - 0.5	1.17 (G)	NA	--	NA	0.99 (G, J)	NA	1.45 (J) ^b	NA	0.86 (G, J)	NA	0.48 (G)	NA
	357D008	1.0 - 1.5	NA	1.56 (G)	NA	--	NA	0.8 (G, J)	NA	1.9 (J) ^b	NA	1.01 (G, J)	NA	0.55 (G)

^aTaken from the generic guidelines for residual concentrations of actinium-228, bismuth-212, lead-214, and thallium-208, as found in Chapter IV of DOE Order 5400.5, Change 2, "Radiation Protection of the Public and Environment." (DOE, 1993). The PALs for these isotopes is specified as 5 pCi/g averaged over the first 15 cm of soil and 15 pCi/g for deeper soils (DOE, 1993). For purposes of this document, 15 cm is assumed to be equivalent to 0.5 ft (6 inches); therefore, 5 pCi/g represents the PALs for these radionuclides in the surface soil (0 to 0.5 ft depth).

^bQualifier added to laboratory data; record accepted. Sample does not meet counting geometry requirements.

ft bgs = Feet below ground surface

cm = Centimeter

pCi/g = Picouries per gram

-- = Not detected above minimum reporting limits

> = Greater than

< = Less than

G = Sample density differs by more than 15% of laboratory control sample density.

J = Estimated value.

NA = Not applicable

Table D.1-15
Soil Sample Results for Isotopes Detected
Above Minimum Detectable Concentrations at CAS 07-09-05, Mud Pit

Sample Location	Sample Number	Depth ft bgs)	Contaminants of Potential Concern (pCi/g)			
			Plutonium-239	Uranium-234	Uranium-235	Uranium-238
Final Action Levels			7.62 ^a	85.9 ^a	10.5 ^a	63.2 ^a
D01	357D001	0.0 - 0.5	0.045 (LT)	0.77	--	0.69
	357D002	1.0 - 1.5	--	1.18	0.049 (LT)	1.09
	357D003	1.5 - 2.0	0.19	1.03	0.059	0.96
D02	357D004	0.0 - 0.5	--	1.05	--	0.94
	357D005	1.0 - 1.5	--	1.22	0.065	1.18
	357D006	1.5 - 2.0	--	0.95	0.075	0.96
D03	357D007	0.0 - 0.5	0.058	0.7	--	0.67
	357D008	1.0 - 1.5	--	0.87	0.07	0.84

^aTaken from the construction, commercial, industrial land use scenario in Table 2.1 of the NCRP Report No. 129 *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 15-mrem/yr dose.

ft bgs = Feet below ground surface

pCi/g = Picocuries per gram

LT = Result is less than the requested minimum detectable concentration, greater than the sample specific minimum detectable concentration.

-- = Not detected above minimum reporting limits

Analytical Tables for CAS 08-09-01

Table D.1-16
Soil Sample Results for Total VOCs Detected Above
Minimum Reporting Limits at CAS 08-09-01, Mud Pit

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (µg/kg)
			Methylene Chloride
Final Action Levels			21,000 ^a
E09	357E015	0.0 - 0.5	14

^aBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2002)

ft bgs = Feet below ground surface

µg/kg = Micrograms per kilogram

Table D.1-17
Soil Sample Results for TPH-DRO Detected
Above Minimum Reporting Limits at CAS 08-09-01, Mud Pit

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (mg/kg)
			Diesel Range Organics
Final Action Levels			100 ^a
E02	357E003	0.0 - 0.5	32 (M)
E04	357E006	0.0 - 0.5	6,200 (M)
	357E007	0.8 - 1.2	1,100 (M)
	357E008	1.5 - 2.0	940 (M)
	357E017	4.5 - 5.0	570 (M)
E06	357E016	2.5 - 3.0	410 (M)

^aBased on *Nevada Administrative Code*; Contamination of soil: Establishment of action levels (NAC, 2002)

ft bgs = Feet below ground surface

mg/kg = Milligrams per kilogram

M = A pattern resembling motor oil was detected.

Table D.1-18
Soil Sample Results for Metals Detected
Above Minimum Reporting Limits at CAS 08-09-01, Mud Pit

			Contaminants of Potential Concern (mg/kg)											
Sample Location	Sample Number	Depth (ft bgs)	Arsenic	Barium	Beryllium	Chromium	Cobalt	Copper	Lead	Mercury	Nickel	Vanadium	Zinc	
Final Action Levels			23 ^a	67,000 ^b	1,900 ^b	450 ^b	1,900 ^b	41,000 ^b	750 ^a	310 ^b	20,000 ^b	7,200 ^b	100,000 ^b	
E01	357E001	0.0 - 0.5	4.1	180	1.4 (J) ^c	2.8	2.1	4.7	250	--	3.8	9.8	25 (J) ^d	
	357E002	0.5 - 1.0	5.2	220	1 (J) ^c	8.2	3.6	12	70	--	13	17	42 (J) ^d	
E02	357E003	0.0 - 0.5	6.2	140	1.4 (J) ^c	2.8	2.7	5.3	130	--	5.3	10	29 (J) ^d	
	357E004	0.7 - 1.2	4.3	290	--	4.4	3.6	5.6	72	--	6.6	16	30 (J)	
E03	357E005	0.0 - 0.5	4	130	1 (J) ^c	25	2.6	5.1	200	--	7.7	11	27 (J) ^d	
E04	357E006	0.0 - 0.5	3.5	110	1.3 (J) ^c	6.9	2.6	5.1	260	0.18 (J-) ^e	4.1	9.8	180 (J) ^d	
	357E007	0.8 - 1.2	3.3	79	0.8 (J) ^c	3.5	1.8	3.6 (J) ^c	57	0.2	3.3	8.5	61	
	357E008	1.5 - 2.0	2.4	80	--	2.2	1.7	2.5	35	0.18 (J-) ^e	2.5	9	41	
E09	357E015	0.0 - 0.5	4.2	110	0.79	4.7	2	6.6	70	--	18	12	26	

^aBased on the background concentrations for metals. Background is considered the mean plus two times the standard deviation for sediment samples collected by the Nevada Bureau of Mines and Geology throughout the Nevada Test and Training Range (NBMG, 1998; Moore, 1999).

^bBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2002)

^cQualifier added to laboratory data; record accepted. Serial dilution %D outside control limits. Matrix effects may exist.

^dQualifier added to laboratory data; record accepted. Matrix spike recovery outside control limits.

^eQualifier added to laboratory data; record accepted. Negative bias fund in continuing calibration/method blank.

ft bgs = Feet below ground surface

mg/kg = Milligrams per kilogram

B = Analyte found in both sample and associated blank.

J = Estimated value.

J- = The result is an estimated quantity, but the result may be biased low.

-- = Not detected above minimum reporting limits.

Table D.1-19
Soil Sample Results for Gamma-Emitting Radionuclides
Detected Above Minimum Detectable Concentrations at CAS 08-09-01, Mud Pit

			Contaminants of Potential Concern (pCi/g)											
Sample Location	Sample Number	Depth (ft bgs)	Actinium-228		Bismuth-214		Cesium-137	Lead-212		Lead-214		Thallium-208		
Final Action Levels			5 ^a	15 ^a	5 ^a	15 ^a	7.30 ^b	5 ^a	15 ^a	5 ^a	15 ^a	5 ^a	15 ^a	
Depth bgs (cm)			<15	>15	<15	>15		<15	>15	<15	>15	<15	>15	
E01	357E001	0.0 - 0.5	1.75 (G)	NA	1.1 (G, J)	NA	0.85 (G)	2.6 (J) ^c	NA	1.1 (G, J)	NA	0.66 (G)	NA	
	357E002	0.5 - 1.0	NA	1.61 (G)	NA	1.3 (G, J)	--	NA	1.61 (J) ^c	NA	1.4 (G, J)	NA	0.5 (G)	
	357E003	0.0 - 0.5	1.83 (G)	NA	1.05 (G, J)	NA	0.217 (G, LT)	2.34 (J) ^c	NA	1.27 (G, J)	NA	0.71 (G)	NA	
E02	357E004	0.7 - 1.2	1.98 (G)	1.98 (G)	NA	0.92 (G, J)	--	NA	2.25 (J) ^c	NA	1.26 (G, J)	NA	0.74 (G)	
E03	357E005	0.0 - 0.5	1.88 (G)	NA	1.18 (G, J)	NA	1.04 (G)	2.22 (J) ^c	NA	1.26 (G, J)	NA	0.63 (G)	NA	
	357E006	0.0 - 0.5	1.96 (G)	NA	0.92 (G, J)	NA	1.47 (G)	2.1 (J) ^c	NA	0.98 (G, J)	NA	0.62 (G)	NA	
E04	357E007	0.8 - 1.2	NA	2.06 (G)	NA	0.89 (G, J)	--	NA	2.38 (J) ^c	NA	1.11 (G, J)	NA	0.62 (G)	
	357E008	1.5 - 2.0	NA	2.4 (G)	NA	1 (G, J)	--	NA	2.35 (J) ^c	NA	0.85 (G, J)	NA	0.77 (G)	
E09	357E015	0.0 - 0.5	1.83 (G)	NA	0.98 (J)	NA	0.81 (G)	1.55 (J) ^c	NA	1.09 (G, J)	NA	0.64 (G)	NA	

^aTaken from the generic guidelines for residual concentrations of actinium-228, bismuth-214, lead-212, lead-214, and thallium-208, as found in Chapter IV of DOE Order 5400.5, Change 2, "Radiation Protection of the Public and Environment." (DOE, 1993). The PALs for these isotopes is specified as 5 pCi/g averaged over the first 15 cm of soil and 15 pCi/g for deeper soils (DOE, 1993). For purposes of this document, 15 cm is assumed to be equivalent to 0.5 ft (6 inches); therefore, 5 pCi/g represents the PALs for these radionuclides in the surface soil (0 to 0.5 ft depth).

^bTaken from the construction, commercial, industrial land use scenario in Table 2.1 of the NCRP Report No. 129, *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 15-mrem/yr. dose.

^cQualifier added to laboratory data; record accepted. Sample does not meet counting geometry requirements.

ft bgs = Feet below ground surface

cm = Centimeter

pCi/g = Picocuries per gram

-- = Not detected above minimum reporting limits

> = Greater than

< = Less than

G = Sample density differs by more than 15% of laboratory control sample density.

J = Estimated value.

LT = Result is less than the requested minimum detectable concentration, greater than the sample specific minimum detectable concentration.

NA = Not applicable

Table D.1-20
Soil Sample Results for Isotopes Detected
Above Minimum Detectable Concentrations at CAS 08-09-01, Mud Pit

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (pCi/g)			
			Plutonium-239	Uranium-234	Uranium-235	Uranium-238
Final Action Levels			7.62 ^a	85.9 ^a	10.5 ^a	63.2 ^a
E01	357E001	0.0 - 0.5	--	1.28	0.094	1.17
	357E002	0.5 - 1.0	--	1.1	0.062	1.03
E02	357E003	0.0 - 0.5	--	1.32	0.074	1.1
	357E004	0.7 - 1.2	--	1.06	--	1.24
E03	357E005	0.0 - 0.5	0.2	1.03	0.105	1.1
E04	357E006	0.0 - 0.5	0.079	0.96	0.058	1.07
	357E007	0.8 - 1.2	--	1.25	--	1.12
	357E008	1.5 - 2.0	--	1.09	--	1.04
E09	357E015	0.0 - 0.5	--	1.36	0.073	1.21

^aTaken from the construction, commercial, industrial land use scenario in Table 2.1 of the NCRP Report No. 129 *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 15-mrem/yr dose.

ft bgs = Feet below ground surface

pCi/g = Picocuries per gram

-- = Not detected above minimum reporting limits

Analytical Tables for CAS 08-09-02

Table D.1-21
Soil Sample Results for Metals Detected
Above Minimum Reporting Limits at CAS 08-09-02, Mud Pit

			Contaminants of Potential Concern (mg/kg)									
Sample Location	Sample Number	Depth (ft bgs)	Arsenic	Barium	Beryllium	Chromium	Cobalt	Copper	Lead	Nickel	Vanadium	Zinc
Final Action Levels			23 ^a	67,000 ^b	1,900 ^b	450 ^b	1,900 ^b	41,000 ^b	750 ^b	20,000 ^b	7,200 ^b	100,000 ^b
F01	357F001	0.0 - 0.5	3.9	160	2 (J)	4.1	2.9	2.8 (J)	15	3.3	17	27
	357F002	1.0 - 1.5	3.2	85	0.62 (J)	3.8	2.6	3.6 (J)	6.7	4.5	11	21
F02	357F003	0.0 - 0.5	4.2	190	2.1 (J)	4.4	2.7	3.5 (J)	16	3.8	16	29
	357F004	1.0 - 1.5	3.4	130	0.82 (J)	4.6	2.9	5.2 (J)	8.3	6	13	27
F03	357F005	0.0 - 0.5	4.2	170	1.9 (J)	4.4	2.7	4 (J)	15	4.6	16	29
	357F006	1.0 - 1.5	3.4	140	0.86 (J)	4.8	2.6	5.4 (J)	9.1	5.7	13	26

^aBased on the background concentrations for metals. Background is considered the mean plus two times the standard deviation for sediment samples collected by the Nevada Bureau of Mines and Geology throughout the Nevada Test and Training Range (NBMG, 1998; Moore, 1999).

^bBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2002)

ft bgs = Feet below ground surface

mg/kg = Milligrams per kilogram

J = Estimated value. Qualifier added to laboratory data; record accepted. Serial dilution %D outside control limits. Matrix effects may exist.

Table D.1-22
Soil Sample Results for Gamma-Emitting Radionuclides
Detected Above Minimum Detectable Concentrations at CAS 08-09-02, Mud Pit

			Contaminants of Potential Concern (pCi/g)											
Sample Location	Sample Number	Depth (ft bgs)	Actinium-228		Bismuth-214		Cesium-137	Lead-212		Lead-214		Thallium-208		
Final Action Levels			5 ^a	15 ^a	5 ^a	15 ^a	7.30 ^b	5 ^a	15 ^a	5 ^a	15 ^a	5 ^a	15 ^a	
Depth bgs (cm)			<15	>15	<15	>15		<15	>15	<15	>15	<15	>15	
F01	357F001	0.0 - 0.5	2.77 (G)	NA	--	NA	2.7 (G)	3.44 (J) ^c	NA	--	NA	0.99 (G)	NA	
	357F002	1.0 - 1.5	NA	2.1	NA	1.07 (J)	--	NA	2.35	NA	1.08 (J) ^c	NA	0.66	
F02	357F003	0.0 - 0.5	2.8 (G)	NA	0.6 (G, J)	NA	1.92 (G)	3.24 (J) ^c	NA	0.72 (G, J)	NA	0.84 (G)	NA	
	357F004	1.0 - 1.5	NA	2.14 (G)	NA	1.13 (G, J)	0.31 (G, LT)	NA	2.48 (J) ^c	NA	1.13 (G, J)	NA	0.69 (G)	
F03	357F005	0.0 - 0.5	2.62 (G)	NA	0.69 (G, J)	NA	1.37 (G)	3.04 (J) ^c	NA	0.72 (G, J)	NA	1.09 (G)	NA	
	357F006	1.0 - 1.5	NA	2.02	NA	1.15 (J)	0.35(LT)	NA	2.54	NA	1.16 (J) ^c	NA	0.74	

^a Taken from the generic guidelines for residual concentrations of actinium-228, bismuth-214, lead-212, lead-214, and thallium-208, as found in Chapter IV of DOE Order 5400.5, Change 2, "Radiation Protection of the Public and Environment." (DOE, 1993). The PALs for these isotopes is specified as 5 pCi/g averaged over the first 15 cm of soil and 15 pCi/g for deeper soils (DOE, 1993). For purposes of this document, 15 cm is assumed to be equivalent to 0.5 ft (6 inches); therefore, 5 pCi/g represents the PALs for these radionuclides in the surface soil (0 to 0.5 ft depth).

^b Taken from the construction, commercial, industrial land use scenario in Table 2.1 of the NCRP Report No. 129, *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 15-mrem/yr. dose.

^c Qualifier added to laboratory data; record accepted. Sample does not meet counting geometry requirements.

ft bgs = Feet below ground surface
cm = Centimeter
pCi/g = Picocuries per gram
-- = Not detected above minimum reporting limits
> = Greater than
< = Less than
G = Sample density differs by more than 15% of laboratory control sample density.
J = Estimated value.
LT = Result is less than the requested minimum detectable concentration, greater than the sample specific minimum detectable concentration.
NA = Not applicable

Table D.1-23
Soil Sample Results for Isotopes Detected
Above Minimum Detectable Concentrations at CAS 08-09-02, Mud Pits

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (pCi/g)			
			Plutonium-239	Uranium-234	Uranium-235	Uranium-238
Final Action Levels			7.62 ^a	85.9 ^a	10.5 ^a	63.2 ^a
F01	357F001	0.0 - 0.5	0.118	0.54	--	0.6
	357F002	1.0 - 1.5	--	1.2	--	1.09
F02	357F003	0.0 - 0.5	0.07	0.59	--	0.63
	357F004	1.0 - 1.5	--	1	--	1.13
F03	357F005	0.0 - 0.5	0.039 (LT)	0.73	--	0.77
	357F006	1.0 - 1.5	--	1.04	0.081	0.97

^aTaken from the construction, commercial, industrial land use scenario in Table 2.1 of the NCRP Report No. 129 *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 15-mrem/yr dose.

ft bgs = Feet below ground surface

pCi/g = Picocuries per gram

LT = Result is less than the requested minimum detectable concentration, greater than the sample specific minimum detectable concentration.

-- = Not detected above minimum reporting limits

Analytical Tables for CAS 08-09-03

Table D.1-24
Soil Sample Results for Metals Detected Above Minimum Reporting Limits at CAS 08-09-03, Mud Pit

Sample Location		Sample Number	Depth (in. bgs)	Contaminants of Potential Concern (mg/kg)											
Final Action Levels		Arsenic		Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Nickel	Selenium	Vanadium	Zinc
		23 ^a		67,000 ^b	1,900 ^b	450 ^b	450 ^b	1,900 ^b	41,000 ^b	750 ^b	310 ^b	20,000 ^b	5,100 ^b	7,200 ^b	100,000 ^b
G01	357G001	0 - 6	6.2	120	0.74 (J) ^c	—	9.3	5.4	13	59	—	20	0.67	14	42 (J) ^d
	357G002	6 - 12	3.7	120	0.66 (J) ^c	—	4.2	2.4	4.6	8.6	—	5.5	—	11	25 (J) ^d
G02	357G003	0 - 6	6.7	120	1.1 (J) ^c	—	10	5.4	13	89	—	15	—	12	41 (J) ^d
	357G004	6 - 12	3.7	94	0.65 (J) ^c	—	3.6	2.2	4	9.9	—	4.7	—	12	24 (J) ^d
G03	357G005	0 - 6	4.9	120	1.1 (J) ^c	1.1	7	2.7	7.6	91	—	9.5	—	11	49 (J) ^d
	357G006	6 - 12	3.8	86	0.6 (J) ^c	—	4	2.6	5.1	8.3	—	5.8	—	12	25 (J) ^d
	357G007	6 - 12	3.7	81	0.58 (J) ^c	—	4.8	2.7	5.6	10	—	7	—	12	27 (J) ^d
G04	357G008	0 - 6	5.7	130	1.1 (J) ^c	7.7	11	3.6	12	130	0.54	13	—	13	96 (J) ^d
	357G009	8 - 12	3.9	94	0.69 (J) ^c	—	5.1	2.8	6.5	21	—	7.2	—	13	30 (J) ^d

^aBased on the background concentrations for metals. Background is considered the mean plus two times the standard deviation for sediment samples collected by the Nevada Bureau of Mines and Geology throughout the Nevada Test and Training Range (NBMG, 1998; Moore, 1999).

^bBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2002)

^cQualifier added to laboratory data; record accepted. Serial dilution %D outside control limits. Matrix effects may exist.

^dQualifier added to laboratory data; record accepted. Matrix spike recovery outside control limits.

in. bgs = Inches below ground surface

mg/kg = Milligrams per kilogram

J = Estimated value.

-- = Not detected above minimum reporting limits.

Table D.1-25
Soil Sample Results for Gamma-Emitting Radionuclides
Detected Above Minimum Detectable Concentrations at CAS 08-09-03, Mud Pit

Sample Location		Sample Number	Depth (in. bgs)	Contaminants of Potential Concern (pCi/g)									
				Actinium-228	Bismuth-214		Cesium-137	Cobalt-60	Lead-212		Lead-214		Thallium-208
Screening Preliminary Action Levels		5 ^a	15 ^a	5 ^a	15 ^a	7.30 ^d	1.61 ^b	5 ^a	15 ^a	5 ^a	15 ^a	5 ^a	15 ^a
			>15	<15	>15				<15	<15	>15	<15	>15
Final Action Levels		NA	NA	NA	NA	232.2 ^c	52.38 ^c	NA	NA	NA	NA	NA	NA
			1.59 (G)	0.95 (G, J)	NA	16 (G)	0.299 (G)	1.97 (J) ^d	NA	1.3 (G, J)	NA	0.56 (G)	NA
G01	357G001	0 - 6	NA	NA	1.03 (G, J)	1.29 (G)	--	NA	2.25 (J) ^d	NA	1.22 (G, J)	NA	0.75 (G)
	357G002	6 - 12	NA	NA	1.62 (G, J)	37.1 (G)	1.12 (G)	2.35 (J) ^d	NA	1.65 (G, J)	NA	0.86 (G)	NA
G02	357G003	0 - 6	NA	NA	1.13 (G, J)	2.55 (G)	--	NA	2.06 (J) ^d	NA	1.18 (G, J)	NA	0.58 (G)
	357G004	6 - 12	NA	NA	1.85 (G, J)	12.4 (G)	0.32 (G)	3.03 (J) ^d	NA	2.14 (G, J)	NA	0.97 (G)	NA
G03	357G005	0 - 6	NA	NA	1.23 (G, J)	0.45 (G, LT)	--	NA	2.26 (J) ^d	NA	1.32 (G, J)	NA	0.7 (G)
	357G006	6 - 12	NA	NA	1.04 (G, J)	0.84 (G)	--	NA	2.39 (J) ^d	NA	1.3 (G, J)	NA	0.67 (G)
G04	357G007	6 - 12	NA	NA	1.77 (G, J)	8.3 (G)	--	2.77 (J) ^d	NA	2.03 (G, J)	NA	0.69 (G)	NA
	357G008	0 - 6	NA	NA	1.02 (J)	0.31 (LT)	--	NA	2.26	NA	1.12 (J)	NA	0.66
G04	357G009	8 - 12	NA	NA	1.68								

^a Taken from the generic guidelines for residual concentrations of actinium-228, bismuth-214, lead-212, lead-214, and thallium-208, as found in Chapter IV of DOE Order 5400.5, Change 2, "Radiation Protection of the Public and Environment." (DOE, 1993). The PALs for these isotopes is specified as 5 pCi/g averaged over the first 15 cm of soil and 15 pCi/g for deeper soils (DOE, 1993). For purposes of this document, 15 cm is assumed to be equivalent to 0.5 ft (6 inches); therefore, 5 pCi/g represents the PALs for these radionuclides in the surface soil (0 to 0.5 ft depth).

^b Taken from the construction, commercial, industrial land use scenario in Table 2.1 of the NCRP Report No. 129, *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 15-mrem/yr. dose.

^c Final action levels calculated using RESRAD computer code (version 6.22).

^d Qualifier added to laboratory data; record accepted. Sample does not meet counting geometry requirements.

in. bgs = Inches below ground surface

cm = Centimeter

pCi/g = Picocuries per gram

-- = Not detected above minimum reporting limits

> = Greater than

< = Less than

G = Sample density differs by more than 15% of laboratory control sample density.

J = Estimated value.

LT = Result is less than the requested minimum detectable concentration, greater than the sample specific minimum detectable concentration.

NA = Not applicable

Table D.1-26
Soil Sample Results for Isotopes Detected
Above Minimum Detectable Concentrations at CAS 08-09-03, Mud Pit

Sample Location	Sample Number	Depth (in. bgs)	Contaminants of Potential Concern (pCi/g)				
			Plutonium-238	Plutonium-239	Uranium-234	Uranium-235	Uranium-238
Screening Preliminary Action Levels			7.78 ^a	7.62 ^a	85.9 ^a	10.5 ^a	63.2 ^a
Final Action Levels			2,680 ^b	2,437 ^b	8,254 ^b	890.3 ^b	3,294 ^b
G01	357G001	0 - 6	0.082	0.64	1.21	0.078	1.19
	357G002	6 - 12	--	--	1.23	0.054	1.23
G02	357G003	0 - 6	0.094	1.18	1.68	0.099	1.7
	357G004	6 - 12	--	0.116	1.32	0.07	1.22
G03	357G005	0 - 6	--	0.275	2.14	0.079	2.11
	357G006	6 - 12	--	--	1.18	--	1.21
	357G007	6 - 12	--	0.117	1.28	0.048 (LT)	1.17
G04	357G008	0 - 6	--	0.329	1.85	0.083	1.79
	357G009	8 - 12	--	--	1.09	--	1.17

^aTaken from the construction, commercial, industrial land use scenario in Table 2.1 of the NCRP Report No. 129 *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 15-mrem/yr dose.

^bFinal action levels calculated using RESRAD computer code (version 6.22).

in. bgs = Inches below ground surface

pCi/g = Picocuries per gram

LT = Result is less than the requested minimum detectable concentration, greater than the sample specific minimum detectable concentration.

-- = Not detected above minimum reporting limits

Analytical Tables for CAS 10-09-02

Table D.1-27
Soil Sample Results for TPH-DRO Detected
Above Minimum Reporting Limits at CAS 10-09-02, Mud Pit

Sample Location	Sample Number	Depth (in. bgs)	Contaminants of Potential Concern (mg/kg)
			Diesel Range Organics
Final Action Levels			100 ^a
H02	357H005	16 - 22	36 (H)

^aBased on *Nevada Administrative Code*; Contamination of soil: Establishment of action levels (NAC, 2002)

in. bgs = Inches below ground surface

mg/kg = Milligrams per kilogram

H = DRO fuel pattern in the heavy end of retention time window.

Table D.1-28
Soil Sample Results for PCBs Detected
Above Minimum Reporting Limits at CAS 10-09-02, Mud Pit

Sample Location	Sample Number	Depth (in. bgs)	Contaminants of Potential Concern (µg/kg)
			Aroclor-1254
Final Action Levels			740 ^a
H05	357H013	14 - 16	42
	357H014	20 - 24	84

^aBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2002)

in. bgs = Inches below ground surface

µg/kg = Micrograms per kilogram

Table D.1-29
Soil Sample Results for Total SVOCs Detected
Above Minimum Reporting Limits at CAS 10-09-02, Mud Pit

Sample Location	Sample Number	Depth (in. bgs)	Contaminants of Potential Concern (µg/kg)	
			Fluoranthene	Pyrene
Final Action Levels			22,000,000 ^a	29,000,000 ^a
H05	357H013	14 - 16	410	370

^aBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2002)

in. bgs = Inches below ground surface

µg/kg = Micrograms per kilogram

Table D.1-30
Soil Sample Results for Metals Detected Above Minimum Reporting Limits at CAS 10-09-02, Mud Pit
(Page 1 of 2)

			Contaminants of Potential Concern (mg/kg)										
Sample Location	Sample Number	Depth (in. bgs)	Arsenic	Barium	Beryllium	Chromium	Cobalt	Copper	Lead	Nickel	Selenium	Vanadium	Zinc
Final Action Levels			23 ^a	67,000 ^b	1,900 ^b	450 ^b	1,900 ^b	41,000 ^b	750 ^b	20,000 ^b	5,100 ^b	7,200 ^b	100,000 ^b
H01	357H001	0 - 6	4.8	42	0.77	--	1.1	2.1	10	--	--	5.1	12 (J) ^d
	357H002	16 - 22	5.2	120	0.89	5.5	3	22	14	6.4	--	16	61 (J) ^d
	357H003	30 - 42	2.7	96	--	--	2.1	8.6	8.6	2.8	--	9.8	30 (J) ^d
H02	357H004	0 - 6	4.1	73	1	--	1.4	2.4	11	--	0.57 (J) ^c	6.8	16 (J) ^d
	357H005	16 - 22	7.8	140	1.3	9.3	4.4	30	18	12	--	23	97 (J) ^d
	357H006	30 - 42	5.2	120	0.93	5.7	3.7	21	14	6.2	--	17	61 (J) ^d
H03	357H007	0 - 6	3.6	58	0.88	--	1.2	2.5	12	--	--	5.5	16 (J) ^d
	357H008	0 - 6	3.5	57	0.86	--	1.2	2.5	8.5	--	--	5.5	15 (J) ^d
	357H009	16 - 22	7.2	150	1.2	8.1	3.9	26	19	11	--	20	87 (J) ^d
H04	357H010	30 - 42	4.6	130	0.73	4.6	3	14	11	5.9	--	14	44 (J) ^d
	357H011	0 - 6	4.7	130	0.72	4	3.1	15	15	6.3	--	13	45 (J) ^d
	357H012	10 - 14	4.8	150	0.95	6	3.9	20	14	7.4	--	15	53 (J) ^d
H05	357H013	14 - 16	4.7	120	0.73	4.5	3.1	15	19	6.3	--	14	50 (J) ^d
	357H014	20 - 24	6	200	0.77	6.3	3.7	14	13	12	0.75 (J) ^c	16	49 (J) ^d

Table D.1-30
Soil Sample Results for Metals Detected Above Minimum Reporting Limits at CAS 10-09-02, Mud Pit
(Page 2 of 2)

			Contaminants of Potential Concern (mg/kg)										
Sample Location	Sample Number	Depth (in. bgs)	Arsenic	Barium	Beryllium	Chromium	Cobalt	Copper	Lead	Nickel	Selenium	Vanadium	Zinc
Final Action Levels			23 ^a	67,000 ^b	1,900 ^b	450 ^b	1,900 ^b	41,000 ^b	750 ^b	20,000 ^b	5,100 ^b	7,200 ^b	100,000 ^b
H06	357H015	14 - 16	6.2	210	0.78	6.6	3.7	12	17	11	--	15	51 (J) ^d
	357H016	20 - 24	5.4	150	0.78	5.2	3.1	16	15	8.4	--	15	48 (J) ^d

^aBased on the background concentrations for metals. Background is considered the mean plus two times the standard deviation for sediment samples collected by the Nevada Bureau of Mines and Geology throughout the Nevada Test and Training Range (NBMG, 1998; Moore, 1999).

^bBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2002)

^cQualifier added to laboratory data; record accepted. Negative bias found in continuing calibration/method blank. CRI/CRA % recovery(ies) criteria was/were not met.

^dQualifier added to laboratory data; record accepted. Serial dilution %D outside control limits. Matrix effects may exist.

in. bgs = Inches below ground surface

mg/kg = Milligrams per kilogram

J = Estimated value.

-- = Not detected above minimum reporting limits

Table D.1-31
Soil Sample Results for Gamma-Emitting Radionuclides
Detected Above Minimum Detectable Concentrations at CAS 10-09-02, Mud Pit
(Page 1 of 2)

			Contaminants of Potential Concern (pCi/g)												
Sample Location	Sample Number	Depth (in. bgs)	Actinium-228		Americium-241	Bismuth-214		Cesium-137	Cobalt-60	Lead-212		Lead-214		Thallium-208	
Screening Preliminary Action Levels			5 ^a	15 ^a	7.62 ^b	5 ^a	15 ^a	7.30 ^b	1.61 ^b	5 ^a	15 ^a	5 ^a	15 ^a	5 ^a	15 ^a
			<15	>15		<15	>15								
Final Action Levels			NA	NA	1,507 ^c	NA	NA	218.2 ^c	48.07 ^c	NA	NA	NA	NA	NA	NA
			1.2 (G)	NA		--	NA								
H01	357H001	0 - 6	NA	NA	--	--	NA	--	--	NA	1.78 (J) ^d	NA	0.94 (G, J)	NA	0.49 (G)
	357H002	16 - 22	NA	1.77 (G)	--	NA	1.05 (G, J)	1.52 (G)	--	NA	1.83 (J) ^d	NA	0.77 (G, J)	NA	0.48 (G)
	357H003	30 - 42	NA	1.54 (G)	--	NA	0.7 (G, J)	--	--	NA	2.94 (J) ^d	NA	1.51 (G, J)	NA	NA
H02	357H004	0 - 6	2.17 (G)	NA	--	1.36 (G, J)	NA	--	--	2.94 (J) ^d	NA	1.51 (G, J)	NA	0.86 (G)	NA
	357H005	16 - 22	NA	1.83 (G)	--	NA	0.84 (G, J)	4.91 (G)	--	NA	2.21 (J)	NA	1.18 (G, J)	NA	0.58 (G)
	357H006	30 - 42	NA	1.83 (G)	--	NA	0.98 (G, J)	0.3 (G, LT)	--	NA	2.09 (J) ^d	NA	1.1 (G, J)	NA	0.55 (G)
H03	357H007	0 - 6	1.89 (G)	NA	--	0.9 (G, J)	NA	--	--	2.03 (J) ^d	NA	1.24 (G, J)	NA	0.75 (G)	NA
	357H008	0 - 6	1.69 (G)	NA	--	1.02 (G, J)	NA	--	--	2.17 (J) ^d	NA	1.21 (G, J)	NA	0.6 (G)	NA
	357H009	16 - 22	NA	1.59 (G)	--	NA	1.03 (G, J)	1.73 (G)	--	NA	2.75 (J) ^d	NA	1.4 (G, J)	NA	0.73 (G)
H04	357H010	30 - 42	NA	1.7 (G)	--	NA	0.85 (G, J)	--	--	NA	1.87 (J) ^d	NA	1.11 (G, J)	NA	0.57 (G)
	357H011	0 - 6	1.33 (G)	NA	5.4 (J) ^d	0.96 (G, J)	NA	13.4 (G)	--	1.4 (J) ^d	NA	1.08 (G, J)	NA	0.53 (G)	NA
	357H012	10 - 14	NA	1.57 (G)	2.09 (G)	NA	0.93 (G, J)	5.38 (G)	--	NA	1.72 (J) ^d	NA	1.21 (G, J)	NA	0.49 (G)
H05	357H013	14 - 16	NA	4 (J) ^d	--	NA	0.7 (G, J)	10.4 (G)	0.163 (G)	NA	1.58 (J) ^d	NA	0.98 (G, J)	NA	0.52 (G)
	357H014	20 - 24	NA	1.43 (G)	3.36 (J) ^d	NA	0.84 (G, J)	8.5 (G)	--	NA	1.43 (J) ^d	NA	0.95 (G, J)	NA	0.52 (G)

Table D.1-31
Soil Sample Results for Gamma-Emitting Radionuclides
Detected Above Minimum Detectable Concentrations at CAS 10-09-02, Mud Pit
(Page 2 of 2)

Contaminants of Potential Concern (pCi/g)														
Sample Location	Sample Number	Depth (in. bgs)	Actinium-228		Americium-241	Bismuth-214		Cesium-137	Cobalt-60	Lead-212		Lead-214		Thallium-208
Screening Preliminary Action Levels			5 ^a	15 ^a	7.62 ^b	5 ^a	15 ^a	7.30 ^b	1.61 ^d	5 ^a	15 ^a	5 ^a	15 ^a	5 ^a 15 ^a
			<15	>15		<15	>15			<15	>15	<15	>15	
Final Action Levels			NA	NA	1,507 ^c	NA	NA	218.2 ^c	48.07 ^c	NA	NA	NA	NA	NA NA
H06	357H015	14 - 16	NA	1.56 (G)	--	NA	0.96 (G, J)	5.12 (G)	--	NA	1.35 (J) ^d	NA	1.1 (G, J)	NA 0.47 (G)
	357H016	20 - 24	NA	1.4	7.13	NA	1.12 (J)	19.4	--	NA	1.27	NA	0.81 (J)	NA 0.41

^aTaken from the generic guidelines for residual concentrations of actinium-228, bismuth-214, lead-212, lead-214, and thallium-208, as found in Chapter IV of DOE Order 5400.5, Change 2, "Radiation Protection of the Public and Environment." (DOE, 1993). The PALs for these isotopes is specified as 5 pCi/g averaged over the first 15 cm of soil and 15 pCi/g for deeper soils (DOE, 1993). For purposes of this document, 15 cm is assumed to be equivalent to 0.5 ft (6 inches); therefore, 5 pCi/g represents the PALs for these radionuclides in the surface soil (0 to 0.5 ft depth).

^bTaken from the construction, commercial, industrial land use scenario in Table 2.1 of the NCRP Report No. 129, *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 15-mrem/yr. dose.

^cFinal action levels calculated using RERAD computer code (version 6.22).

^dQualifier added to laboratory data; record accepted. Sample does not meet counting geometry requirements.

in. bgs = Inches below ground surface

cm = Centimeter

pCi/g = Picouries per gram

-- = Not detected above minimum reporting limits

> = Greater than

< = Less than

G = Sample density differs by more than 15% of laboratory control sample density.

J = Estimated value.

LT = Result is less than the requested minimum detectable concentration, greater than the sample specific minimum detectable concentration.

NA = Not applicable

Table D.1-32
Soil Sample Results for Isotopes Detected
Above Minimum Detectable Concentrations at CAS 10-09-02, Mud Pit

Sample Location	Sample Number	Depth (in. bgs)	Contaminants of Potential Concern (pCi/g)					
			Plutonium-238	Plutonium-239	Strontium-90	Uranium-234	Uranium-235	Uranium-238
Screening Preliminary Action Levels			7.78 ^a	7.62 ^a	503 ^a	85.9 ^a	10.5 ^a	63.2 ^a
Final Action Levels			1,887 ^b	1,714 ^b	25,430 ^b	6,438 ^b	831.2 ^b	2,875 ^b
H01	357H001	0 - 6	--	0.066	--	0.91	--	0.76
	357H002	16 - 22	0.135	0.83	--	1.01	0.055	0.97
	357H003	30 - 42	--	--	--	1.07	--	0.96
H02	357H004	0 - 6	--	0.231	--	1.29	--	1.38
	357H005	16 - 22	0.52	3.47	0.61	1.07	0.06	1.32
	357H006	30 - 42	--	0.12	--	0.97	0.117	0.97
H03	357H007	0 - 6	--	0.144	--	1.17	0.062	1.2
	357H008	0 - 6	--	--	--	1.06	0.071	1.03
	357H009	16 - 22	0.156	0.96	--	1.25	0.127	1.24
	357H010	30 - 42	--	--	--	0.92	0.07	0.9
H04	357H011	0 - 6	2.42	14.8	1.98	0.9	--	0.84
	357H012	10 - 14	0.46	3.21	0.66	1.05	0.089	0.88
H05	357H013	14 - 16	2.38	13.7	1.87	1.03	--	0.91
	357H014	20 - 24	1.29	8.2	1.18	1.13	0.056	1.02
H06	357H015	14 - 16	4.01	25	0.99	1.19	--	0.95
	357H016	20 - 24	3.11	18.3	2.52	1.08	0.05 (LT)	0.91

^aTaken from the construction, commercial, industrial land use scenario in Table 2.1 of the NCRP Report No. 129 *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 15-mrem/yr dose.

^bFinal action levels calculated using RESRAD computer code (version 6.22).

in. bgs = Inches below ground surface

pCi/g = Picocuries per gram

LT = Result is less than the requested minimum detectable concentration, greater than the sample specific minimum detectable concentration.

-- = Not detected above minimum reporting limits

Analytical Tables for CAS 10-09-04

Table D.1-33
Soil Sample Results for Total VOCs Detected
Above Minimum Reporting Limits at CAS 10-09-04, Mud Pit

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (µg/kg)	
			Styrene	Tetrachloroethene
Final Action Levels			1,700,000 ^a	3,400 ^a
I03	357I003	0.0 - 0.5	8.2	10

^aBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2002)

ft bgs = Feet below ground surface

µg/kg = Micrograms per kilogram

Table D.1-34
Soil Sample Results for Metals Detected Above Minimum Reporting Limits at CAS 10-09-04, Mud Pit

			Contaminants of Potential Concern (mg/kg)										
Sample Location	Sample Number	Depth (ft bgs)	Arsenic	Barium	Beryllium	Chromium	Cobalt	Copper	Lead	Mercury	Nickel	Vanadium	Zinc
Final Action Levels			23 ^a	67,000 ^d	1,900 ^d	450 ^d	1,900 ^d	41,000 ^b	750 ^b	310 ^b	20,000 ^b	7,200 ^b	100,000 ^b
101	3571001	0.0 - 0.5	3.6	140	0.62 (J)	3.4	2.8	4.8 (J)	14	--	3.9	12	31
102	3571002	0.0 - 0.5	3.7	120	0.63 (J)	4.1	3.2	5.6 (J)	13	--	4.7	14	32
103	3571003	0.0 - 0.5	2.4	90	--	2.7	2	3.6 (J)	13	0.16	2.4	12	25

^aBased on the background concentrations for metals. Background is considered the mean plus two times the standard deviation for sediment samples collected by the Nevada Bureau of Mines and Geology throughout the Nevada Test and Training Range (NBMG, 1998; Moore, 1999).

^bBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2002)

ft bgs = Feet below ground surface

mg/kg = Milligrams per kilogram

J = Estimated value. Qualifier added to laboratory data; record accepted. Serial dilution %D outside control limits. Matrix effects may exist.

-- = Not detected above minimum reporting limits

Table D.1-35
Soil Sample Results for Gamma-Emitting Radionuclides
Detected Above Minimum Detectable Concentrations at CAS 10-09-04, Mud Pit

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (pCi/g)					
			Actinium-228	Bismuth-214	Cesium-137	Lead-212	Lead-214	Thallium-208
Final Action Levels			5 ^a	5 ^a	7.30 ^b	5 ^a	5 ^a	5 ^a
Depth bgs (cm)			<15	<15		<15	<15	<15
I01	357I001	0.0 - 0.5	1.38 (G)	0.7 (G, J)	3.38 (G)	1.55 (J) ^c	0.84 (G, J)	0.513 (G)
I02	357I002	0.0 - 0.5	1.55 (G)	1.22 (G, J)	4.19 (G)	2.02 (J) ^c	1.18 (G, J)	0.58 (G)
I03	357I003	0.0 - 0.5	1.69 (G)	0.93 (G, J)	1.06 (G)	2.03 (J) ^c	1.09 (G, J)	0.66 (G)

^aTaken from the generic guidelines for residual concentrations of actinium-228, bismuth-214, lead-212, lead-214, and thallium-208, as found in Chapter IV of DOE Order 5400.5, Change 2, "Radiation Protection of the Public and Environment." (DOE, 1993). The PALs for these isotopes is specified as 5 pCi/g averaged over the first 15 cm of soil and 15 pCi/g for deeper soils (DOE, 1993). For purposes of this document, 15 cm is assumed to be equivalent to 0.5 ft (6 inches); therefore, 5 pCi/g represents the PALs for these radionuclides in the surface soil (0 to 0.5 ft depth).

^bTaken from the construction, commercial, industrial land use scenario in Table 2.1 of the NCRP Report No. 129, *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 15-mrem/yr. dose.

^cQualifier added to laboratory data; record accepted. Sample does not meet counting geometry requirements.

ft bgs = Feet below ground surface

cm = Centimeter

pCi/g = Picocuries per gram

< = Less than

G = Sample density differs by more than 15% of laboratory control sample density.

J = Estimated value.

Table D.1-36
Soil Sample Results for Isotopes Detected Above
Minimum Detectable Concentrations at CAS 10-09-04, Mud Pit

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (pCi/g)				
			Plutonium-238	Plutonium-239	Uranium-234	Uranium-235	Uranium-238
Final Action Levels			7.78 ^a	7.62 ^a	85.9 ^a	10.5 ^a	63.2 ^a
I01	357I001	0.0 - 0.5	0.47	5.54 (J)	1.02	0.057	0.88
I02	357I002	0.0 - 0.5	0.321	4.57 (J)	1.02	0.07	1.02
I03	357I003	0.0 - 0.5	0.128	1.56 (J)	1.1	0.084	0.93

^aTaken from the construction, commercial, industrial land use scenario in Table 2.1 of the NCRP Report No. 129 *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 15-mrem/yr dose.

ft bgs = Feet below ground surface

pCi/g = Picocuries per gram

J = Estimated value. Qualifier added to laboratory data; record accepted. Duplicate normalized different outside control limits.

Analytical Tables for CAS 10-09-05

Table D.1-37
Soil Sample Results for Total VOCs Detected
Above Minimum Reporting Limits at CAS 10-09-05, Mud Pit

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (µg/kg)
			Methylene Chloride
Final Action Levels			21,000 ^a
J01	357J001	0.0 - 0.5	9.9
J02	357J002	0.0 - 0.5	14

^aBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2002)

ft bgs = Feet below ground surface

µg/kg = Micrograms per kilogram

Table D.1-38
Soil Sample Results for Metals Detected Above Minimum Reporting Limits at CAS 10-09-05, Mud Pit

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (mg/kg)										
			Arsenic	Barium	Beryllium	Chromium	Cobalt	Copper	Lead	Mercury	Nickel	Vanadium	Zinc
Final Action Levels			23 ^a	67,000 ^b	1,900 ^b	450 ^b	1,900 ^b	41,000 ^b	750 ^b	310 ^b	20,000 ^b	7,200 ^b	100,000 ^b
J01	357J001	0.0 - 0.5	8.1	190	1.8	15	8.6	24	16	0.16	23	23	77
J02	357J002	0.0 - 0.5	7.6	120	1.1	17	8.1	24	14	--	27	26	81

^aBased on the background concentrations for metals. Background is considered the mean plus two times the standard deviation for sediment samples collected by the Nevada Bureau of Mines and Geology throughout the Nevada Test and Training Range (NBMG, 1998; Moore, 1999).

^bBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2002)

ft bgs = Feet below ground surface

mg/kg = Milligrams per kilogram

-- = Not detected above minimum reporting limits

Table D.1-39
Soil Sample Results for Gamma-Emitting Radionuclides Detected
Above Minimum Detectable Concentrations at CAS 10-09-05, Mud Pit

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (pCi/g)					
			Actinium-228	Bismuth-214	Cesium-137	Lead-212	Lead-214	Thallium-208
Final Action Levels			5 ^a	5 ^a	7.3 ^b	5 ^a	5 ^a	5 ^a
Depth bgs (cm)			<15	<15		<15	<15	<15
J01	357J001	0.0 - 0.5	2.4 (G)	1.35 (G, J)	2.72 (G)	2.69 (J) ^c	1.65 (G, J)	0.77 (G)
J02	357J002	0.0 - 0.5	1.09 (G)	0.96 (G, J)	--	2.27 (J) ^c	1.03 (G, J)	0.67 (G)

^aTaken from the generic guidelines for residual concentrations of actinium-228, bismuth-214, lead-212, lead-214, and thallium-208, as found in Chapter IV of DOE Order 5400.5, Change 2, "Radiation Protection of the Public and Environment." (DOE, 1993). The PALs for these isotopes is specified as 5 pCi/g averaged over the first 15 cm of soil and 15 pCi/g for deeper soils (DOE, 1993). For purposes of this document, 15 cm is assumed to be equivalent to 0.5 ft (6 inches); therefore, 5 pCi/g represents the PALs for these radionuclides in the surface soil (0 to 0.5 ft depth).

^bTaken from the construction, commercial, industrial land use scenario in Table 2.1 of the NCRP Report No. 129, *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 15-mrem/yr. dose.

^cQualifier added to laboratory data; record accepted. Sample does not meet counting geometry requirements.

ft bgs = Feet below ground surface

cm = Centimeter

pCi/g = Picocuries per gram

< = Less than

G = Sample density differs by more than 15% of laboratory control sample density.

J = Estimated value.

Table D.1-40
Soil Sample Results for Isotopes Detected
Above Minimum Detectable Concentrations at CAS 10-09-05, Mud Pit

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (pCi/g)					
			Plutonium-238	Plutonium-239	Strontium-90	Uranium-234	Uranium-235	Uranium-238
Final Action Levels			7.78 ^a	7.62 ^a	503 ^a	85.9 ^a	10.5 ^a	63.2 ^a
J01	357J001	0.0 - 0.5	0.073	0.93	0.45 (LT)	1.28	0.047 (LT)	1.18
J02	357J002	0.0 - 0.5	--	--	--	0.98	--	1.01

^aTaken from the construction, commercial, industrial land use scenario in Table 2.1 of the NCRP Report No. 129 *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 15-mrem/yr dose.

ft bgs = Feet below ground surface

pCi/g = Picocuries per gram

LT = Result is less than the requested minimum detectable concentration, greater than the sample specific minimum detectable concentration.

-- = Not detected above minimum reporting limits

Analytical Tables for CAS 10-09-06

Table D.1-41
Soil Sample Results for Total VOCs Detected
Above Minimum Reporting Limits at CAS 10-09-06, Mud Pit

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (µg/kg)
			Methylene Chloride
Final Action Levels			21,000 ^a
K01	357K001	0.0 - 0.5	13
K02	357K002	0.0 - 0.5	5.9
	357K003	0.0 - 0.5	6
K03	357K004	0.0 - 0.5	5.7

^aBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2002)

ft bgs = Feet below ground surface

µg/kg = Micrograms per kilogram

Table D.1-42
Soil Sample Results for TPH-DRO Detected Above
Minimum Reporting Limits for CAS 10-09-06, Mud Pit

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (mg/kg)
			Diesel Range Organics
Final Action Levels			100 ^a
K03	357K004	0.0 - 0.5	31 (H, M)

^aBased on *Nevada Administrative Code*; Contamination of soil: Establishment of action levels (NAC, 2002)

ft bgs = Feet below ground surface

mg/kg = Milligrams per kilogram

H = DRO fuel pattern in the heavy end of retention time window.

M = A pattern resembling motor oil was detected.

Table D.1-43
Soil Sample Results for PCBs Detected Above
Minimum Reporting Limits at CAS 10-09-06, Mud Pit

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (µg/kg)
			Aroclor-1260
Final Action Levels			740 ^a
K03	357K004	0.0 - 0.5	77 (J)

^aBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2002)

ft bgs = Feet below ground surface

µg/kg = Micrograms per kilogram

J = Estimated value

Table D.1-44
Soil Sample Results for Metals Detected Above Minimum
Reporting Limits at CAS 10-09-06, Mud Pit; Stains; Material

			Contaminants of Potential Concern (mg/kg)									
Sample Location	Sample Number	Depth (ft bgs)	Arsenic	Barium	Beryllium	Chromium	Cobalt	Copper	Lead	Nickel	Vanadium	Zinc
Final Action Levels			23 ^a	67,000 ^b	1,900 ^b	450 ^b	1,900 ^b	41,000 ^b	750 ^b	20,000 ^b	7,200 ^b	100,000 ^b
K01	357K001	0.0 - 0.5	7.1	150	0.96	11	4.1	16	14	18	16	54
K02	357K002	0.0 - 0.5	5.9	140	0.86	8.8	3.7	13	11	15	16	49
	357K003	0.0 - 0.5	5.7	120	0.85	8.9	3.7	14	9	17	15	52
K03	357K004	0.0 - 0.5	12	190	0.78	9.9	4.3	19	20	18	20	57

^aBased on the background concentrations for metals. Background is considered the mean plus two times the standard deviation for sediment samples collected by the Nevada Bureau of Mines and Geology throughout the Nevada Test and Training Range (NBMG, 1998; Moore, 1999).

^bBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2002)

ft bgs = Feet below ground surface
mg/kg = Milligrams per kilogram

Table D.1-45
Soil Sample Results for Gamma-Emitting Radionuclides
Detected Above Minimum Detectable Concentrations at CAS 10-09-06, Mud Pit

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (pCi/g)						
			Actinium-228	Bismuth-214	Cesium-137	Cobalt-60	Lead-212	Lead-214	Thallium-208
Screening Preliminary Action Levels			5 ^a	5 ^a	7.30 ^b	1.61 ^b	5 ^a	5 ^a	5 ^a
Depth bgs (cm)			<15	<15			<15	<15	<15
Final Action Levels			NA	NA	219.3 ^c	48.32 ^c	NA	NA	NA
K01	357K001	0.0 - 0.5	1.57 (G)	1.54 (G, J)	--	--	1.93 (J) ^d	1.16 (G, J)	0.65 (G)
K02	357K002	0.0 - 0.5	1.52 (G)	0.93 (G, J)	--	5.04 (G)	1.63 (J) ^d	1.12 (G, J)	0.47 (G)
	357K003	0.0 - 0.5	1.36 (G)	1.08 (G, J)	--	5.33 (G)	1.46 (J) ^d	0.94 (G, J)	0.51 (G)
K03	357K004	0.0 - 0.5	1.53 (G)	1.11 (G, J)	0.46 (G, LT)	4.12 (G)	1.81 (J) ^d	1.28 (G, J)	0.48 (G)
K04	357K005	0.0 - 0.5	--	--	--	140 (G)	1.46 (J) ^d	--	--
	357K006	1.5 - 2.0	--	--	--	2.41 (G)	1.23 (J) ^d	0.81 (G, J)	--

^aTaken from the generic guidelines for residual concentrations of actinium-228, bismuth-214, lead-212, lead-214, and thallium-208, as found in Chapter IV of DOE Order 5400.5, Change 2, "Radiation Protection of the Public and Environment." (DOE, 1993). The PALs for these isotopes is specified as 5 pCi/g averaged over the first 15 cm of soil and 15 pCi/g for deeper soils (DOE, 1993). For purposes of this document, 15 cm is assumed to be equivalent to 0.5 ft (6 inches); therefore, 5 pCi/g represents the PALs for these radionuclides in the surface soil (0 to 0.5 ft depth).

^bTaken from the construction, commercial, industrial land use scenario in Table 2.1 of the NCRP Report No. 129, *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 15-mrem/yr. dose.

^cFinal action levels calculated using RESRAD computer code (version 6.22).

^dQualifier added to laboratory data; record accepted. Sample does not meet counting geometry requirements.

ft bgs = Feet below ground surface

cm = Centimeter

pCi/g = Picocuries per gram

-- = Not detected above minimum reporting limits

< = Less than

G = Sample density differs by more than 15% of laboratory control sample density.

J = Estimated value.

LT = Result is less than the requested minimum detectable concentration, greater than the sample specific minimum detectable concentration.

NA = Not applicable

Table D.1-46
Soil Sample Results for Isotopes Detected
Above Minimum Detectable Concentrations at CAS 10-09-06, Mud Pit

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (pCi/g)			
			Plutonium-239	Uranium-234	Uranium-235	Uranium-238
Screening Preliminary Action Levels			7.62 ^a	85.9 ^a	10.5 ^a	63.2 ^a
Final Action Levels			1,754 ^b	6,615 ^b	836.5 ^b	2,914 ^b
K01	357K001	0.0 - 0.5	0.251 (J)	1.09	--	1.1
K02	357K002	0.0 - 0.5	--	1	0.046 (LT)	1.05
	357K003	0.0 - 0.5	--	1.05	--	1.02
K03	357K004	0.0 - 0.5	0.101	1.07	0.08	1.05

^aTaken from the construction, commercial, industrial land use scenario in Table 2.1 of the NCRP Report No. 129 *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 15-mrem/yr dose.

^bFinal action levels calculated using RESRAD computer code (version 6.22).

ft bgs = Feet below ground surface

pCi/g = Picocuries per gram

J = Estimated value. Qualifier added to laboratory data; record accepted. Duplicate precision analysis (relative percent difference) outside control limits.

LT = Result is less than requested minimum detectable concentration, greater than the sample specific minimum detectable concentration.

Analytical Tables for CAS 01-99-01

Table D.1-47
Soil Sample Results for Gamma-Emitting Radionuclides Detected
Above Minimum Detectable Concentrations at CAS 01-99-01, Boxes; Pipes

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (pCi/g)					
			Actinium-228	Bismuth-214	Cesium-137	Lead-212	Lead-214	Thallium-208
Final Action Levels			5 ^a	5 ^a	7.30 ^b	5 ^a	5 ^a	5 ^a
Depth bgs (cm)			<15	<15		<15	<15	<15
L01	357L001	0.0 - 0.5	1.47 (G)	1.03 (G, J)	--	1.66 (J) ^c	1.27 (G, J)	0.58 (G)
L02	357L002	0.0 - 0.5	1.63 (G)	1.09 (G, J)	0.46 (G, LT)	1.71 (J) ^c	1.18 (G, J)	0.53 (G)
	357L003	0.0 - 0.5	1.61 (G)	1.38 (G, J)	0.95 (G)	1.93 (J) ^c	1.36 (G, J)	0.53 (G)

^aTaken from the generic guidelines for residual concentrations of actinium-228, bismuth-214, lead-212, lead-214, and thallium-208, as found in Chapter IV of DOE Order 5400.5, Change 2, "Radiation Protection of the Public and Environment." (DOE, 1993). The PALs for these isotopes is specified as 5 pCi/g averaged over the first 15 cm of soil and 15 pCi/g for deeper soils (DOE, 1993). For purposes of this document, 15 cm is assumed to be equivalent to 0.5 ft (6 inches); therefore, 5 pCi/g represents the PALs for these radionuclides in the surface soil (0 to 0.5 ft depth).

^bTaken from the construction, commercial, industrial land use scenario in Table 2.1 of the NCRP Report No. 129, *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 15-mrem/yr. dose.

^cQualifier added to laboratory data; record accepted. Sample does not meet counting geometry requirements.

ft bgs = Feet below ground surface

cm = Centimeter

pCi/g = Picocuries per gram

-- = Not detected above minimum reporting limits

< = Less than

G = Sample density differs by more than 15% of laboratory control sample density.

J = Estimated value.

LT = Result is less than the requested minimum detectable concentration, greater than the sample specific minimum detectable concentration.

Table D.1-48
Soil Sample Results for Isotopes Detected
Above Minimum Detectable Concentrations at CAS 01-99-01, Boxes; Pipes

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (pCi/g)				
			Plutonium-238	Plutonium-239	Uranium-234	Uranium-235	Uranium-238
Final Action Levels			7.78 ^a	7.62 ^a	85.9 ^a	10.5 ^a	63.2 ^a
L01	357L001	0.0 - 0.5	--	0.88	0.96	0.059	0.91
L02	357L002	0.0 - 0.5	0.046 (LT)	0.76	1	0.035 (LT)	0.97
	357L003	0.0 - 0.5	0.098	1.84	0.84	0.062	0.91

^aTaken from the construction, commercial, industrial land use scenario in Table 2.1 of the NCRP Report No. 129 *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 15-mrem/yr dose.

ft bgs = Feet below ground surface

pCi/g = Picocuries per gram

LT = Result is less than the requested minimum detectable concentration, greater than the sample specific minimum detectable concentration.

-- = Not detected above minimum reporting limits

Analytical Tables for CAS 04-26-03

Table D.1-49
Sample Results for Metals Detected Above
Minimum Reporting Limits at CAS 04-26-03, Lead Bricks
(Page 1 of 5)

Sample Location	Sample Number	Depth (in. bgs)	Contaminants of Potential Concern (mg/kg)
			Lead
Screening Preliminary Action Levels			750 ^a
Final Action Levels			17,079 ^b
M01	357M001	0 - 4	510
	357M002	0 - 4	290
M02	357M003	0 - 4	620
M03	357M004	0 - 4	17,000
	357M010	6 - 8	3,500
	357M064	12 - 14	2,700
	357M067	14 - 16	1,100
	357M101	22 - 24	250 (J)
M04	357M005	0 - 4	1,700
	357M034	6 - 7	82
	357M061	7 - 8	86
M05	357M006	0 - 4	5,300
	357M062	6 - 8	310
	357M063	12 - 14	1,200
	357M102	18 - 20	63 (J)
M06	357M007	0 - 4	4,500
	357M018	6 - 8	1,300
	357M103	12 - 14	310 (J)
	357M104	12 - 14	260 (J)
M07	357M008	0 - 4	150
M08	357M009	0 - 4	130
M11	357M011	6 - 8	950
	357M105	14 - 16	95 (J)
M12	357M012	4 - 6	12,000
	357M013	6 - 8	5,000
	357M109	18 - 20	270 (J)
M13	357M014	4 - 6	3,700
	357M015	6 - 8	220

Table D.1-49
Sample Results for Metals Detected Above
Minimum Reporting Limits at CAS 04-26-03, Lead Bricks
(Page 2 of 5)

Sample Location	Sample Number	Depth (in. bgs)	Contaminants of Potential Concern (mg/kg)
			Lead
Screening Preliminary Action Levels			750 ^a
Final Action Levels			17,079 ^b
M14	357M016	4 - 6	220
	357M017	6 - 8	640
M15	357M019	0 - 4	9,700
	357M108	6 - 8	760 (J)
	357M110	14 - 16	4,300 (J)
M16	357M020	0 - 4	14,000
	357M065	6 - 8	100
	357M066	12 - 14	2,400
	357M111	22 - 24	21 (J)
M17	357M021	0 - 4	3,200
	357M112	6 - 8	430 (J)
	357M113	14 - 16	120 (J)
M18	357M022	4 - 6	11
M19	357M023	4 - 6	160
	357M024	4 - 6	260
M20	357M025	4 - 6	180
M21	357M026	4 - 6	110
M22	357M027	4 - 6	26
M23	357M028	4 - 6	23
M24	357M029	4 - 6	34
M25	357M030	4 - 6	41
M26	357M031	4 - 6	31
M27	357M032	5 - 7	190
M28	357M033	5 - 7	120
M29	357M035	4 - 6	250
M30	357M036	4 - 6	16
M31	357M037	4 - 6	150
M32	357M038	5 - 7	700

Table D.1-49
Sample Results for Metals Detected Above
Minimum Reporting Limits at CAS 04-26-03, Lead Bricks
(Page 3 of 5)

Sample Location	Sample Number	Depth (in. bgs)	Contaminants of Potential Concern (mg/kg)
			Lead
Screening Preliminary Action Levels			750 ^a
Final Action Levels			17,079 ^b
M33	357M039	5 - 7	54
	357M040	5 - 7	53
M34	357M041	4 - 6	42
M35	357M042	5 - 7	460
M36	357M043	5 - 7	650
M37	357M044	4 - 6	96
M38	357M045	4 - 6	99
M39	357M046	4 - 6	16
M40	357M047	4 - 6	15
M41	357M048	0 - 4	44
M42	357M049	0 - 4	42
M43	357M050	0 - 4	19
	357M051	0 - 4	23
M44	357M052	0 - 4	31
M45	357M053	0 - 4	160
M46	357M054	0 - 4	150
M47	357M055	0 - 4	39
M48	357M056	0 - 4	48
M49	357M057	0 - 4	110
M50	357M058	0 - 4	97
M51	357M059	0 - 4	470
M52	357M060	0 - 4	49
M53	357M068	4 - 6	35 (J)
M54	357M069	5 - 7	22 (J)
M55	357M070	4 - 6	42 (J)
	357M071	4 - 6	48 (J)
M56	357M072	4 - 6	17 (J)
M57	357M073	5 - 7	24 (J)
M58	357M074	6 - 8	44 (J)

Table D.1-49
Sample Results for Metals Detected Above
Minimum Reporting Limits at CAS 04-26-03, Lead Bricks
(Page 4 of 5)

Sample Location	Sample Number	Depth (in. bgs)	Contaminants of Potential Concern (mg/kg)
			Lead
Screening Preliminary Action Levels			750 ^a
Final Action Levels			17,079 ^b
M59	357M075	6 - 8	83 (J)
M60	357M076	5 - 7	12 (J)
M61	357M077	5 - 7	29 (J)
M62	357M078	4 - 6	59 (J)
M63	357M079	5 - 7	17 (J)
M64	357M080	4 - 6	23 (J)
M65	357M081	6 - 8	230
M66	357M082	5 - 7	17
M67	357M083	6 - 8	70
M68	357M084	5 - 7	16
M69	357M085	5 - 7	14
M70	357M086	4 - 6	16
	357M087	4 - 6	25
M71	357M088	6 - 8	150
M72	357M089	4 - 6	45
M73	357M090	5 - 7	51
M74	357M091	6 - 8	4,400
	357M106	14 - 16	69 (J)
M75	357M092	5 - 7	150
M76	357M093	6 - 8	3,000
	357M107	14 - 16	350 (J)
M77	357M094	6 - 8	20
M78	357M095	6 - 8	130
M79	357M096	6 - 8	24
M80	357M097	5 - 7	38
M81	357M098	5 - 7	34
M82	357M099	6 - 8	33
M83	357M100	5 - 7	21

Table D.1-49
Sample Results for Metals Detected Above
Minimum Reporting Limits at CAS 04-26-03, Lead Bricks
(Page 5 of 5)

Sample Location	Sample Number	Depth (in. bgs)	Contaminants of Potential Concern (mg/kg)
			Lead
Screening Preliminary Action Levels			750 ^a
Final Action Levels			17,079 ^b
M84	357M114	0 - 4	91 (J)
	357M115	6 - 8	430 (J)
M85	357M116	0 - 4	19,000 (J)
	357M117	6 - 8	290 (J)
M86	357M118	0 - 4	9,700 (J)
	357M119	6 - 8	3,100 (J)
M87	357M120	0 - 4	4,700 (J)
	357M121	8 - 10	630 (J)

^aBased on U.S. Environmental Protection Agency, Region 9 Preliminary Remediation Goals (PRGs) (EPA, 2002).

^bFinal action levels calculated based on U.S. Environmental Protection Agency Adult Lead Methodology

in. bgs = Inches below ground surface

mg/kg = Milligrams per kilogram

J = Estimated value. Qualifier added to laboratory data; record accepted. Duplicate precision analysis (relative percent difference) outside control limits.

Analytical Tables for CAS 25-15-01

Table D.1-50
Soil Sample Results for Metals Detected Above Minimum Reporting Limits at CAS 25-15-01, Waste Dump

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (mg/kg)										
			Arsenic	Barium	Beryllium	Chromium	Cobalt	Copper	Lead	Mercury	Nickel	Vanadium	Zinc
Final Action Levels			23 ^a	67,000 ^b	1,900 ^b	450 ^b	1,900 ^b	41,000 ^b	750 ^b	310 ^b	20,000 ^b	7,200 ^b	100,000 ^b
N01	357N001	0.0 - 0.5	3.2	110	--	5.9	4.2 (J)	6.1 (J)	7	--	5.5	20	26 (J)
N02	357N004	14.0 - 15.0	3	76	--	5.4	3.7 (J)	4.5 (J)	3.9	--	4.2	24	22 (J)
N03	357N005	0.0 - 0.5	3.6	140	--	6.4	3.9 (J)	6.6 (J)	7.4	--	5.8	22	27 (J)
	357N006	19.0 - 20.0	5.1	98	--	4.8	3.7 (J)	6.7 (J)	--	--	5.4	15	20 (J)
N04	357N007	0.0 - 0.5	4.7	130	0.64	7.2	4.3	8.1	7.4	0.035 (J-)	7	17	28
	357N008	1.5 - 2.0	3.9	100	--	4.8	3.7	5.4	3.9	--	4.6	17	18
N05	357N009	0.0 - 0.5	3.4	120	--	6.7	4.5	5.7	7.9	--	5.4	20	23
N06	357N010	0.0 - 0.5	3	72	--	5.3	3.9	4.5	5.4	--	4.1	21	20
N07	357N011	NA	3.1	110	--	4.2	3.3	4.2	4.5	--	4.3	14	17
	357N012	NA	2.9	89	--	4.3	4.3	4.1	4.8	--	3.9	15	17
N08	357N013	NA	3.7	100	--	4.8	3.7	4.5	4.8	--	4.2	17	19
N09	357N014	NA	3.3	96	--	5.3	3.6	4.5	5.5	--	5	19	19
N10	357N015	NA	2.6	94	--	6.5	3.8	4.9	6.1	--	4.7	21	22

^aBased on the background concentrations for metals. Background is considered the mean plus two times the standard deviation for sediment samples collected by the Nevada Bureau of Mines and Geology throughout the Nevada Test and Training Range (NBMG, 1998; Moore, 1999).

^bBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2002)

ft bgs = Feet below ground surface

mg/kg = Milligrams per kilogram

J = Estimated value. Qualifier added to laboratory data; record accepted. Serial dilution %D outside control limits. Matrix effects may exist.

J- = The result is an estimated quantity, but the result may be biased low. Negative bias found in continuing calibration/method blank.

Table D.1-51
Soil Sample Results for Gamma-Emitting Radionuclides Detected
Above Minimum Detectable Concentrations at CAS 25-15-01, Waste Dump
(Page 1 of 2)

			Contaminants of Potential Concern (pCi/g)											
Sample Location	Sample Number	Depth (ft bgs)	Actinium-228		Bismuth-214		Lead-212		Lead-214		Thallium-208			
Final Action Levels			5 ^a	15 ^a	5 ^a	15 ^a	5 ^a	15 ^a	5 ^a	15 ^a	5 ^a	15 ^a		
	Depth bgs (cm)		<15	>15	<15	>15	<15	>15	<15	>15	<15	>15		
N01	357N001	0.0 - 0.5	1.62	NA	0.98 (J)	NA	1.69	NA	1.2 (J)	NA	0.5	NA		
N02	357N004	14.0 - 15.0	NA	1.6	NA	0.87 (J)	NA	1.7	NA	0.97 (J)	NA	0.48		
N03	357N005	0.0 - 0.5	1.41	NA	1.12 (J)	NA	1.69	NA	1.11 (J)	NA	0.447	NA		
	357N006	19.0 - 20.0	NA	1.11 (G)	NA	1.67 (G, J)	NA	1.4 (J) ^b	NA	1.81 (G, J)	NA	0.354 (G)		
N04	357N007	0.0 - 0.5	1.34 (G)	NA	1.05 (G, J)	NA	1.42 (J)	NA	1.25 (G, J)	NA	0.51 (G)	NA		
	357N008	1.5 - 2.0	NA	1.5	NA	1.17 (J)	NA	1.61	NA	1.1 (J)	NA	0.51		
N05	357N009	0.0 - 0.5	1.33	NA	0.95 (J)	NA	1.84	NA	1.14 (J)	NA	0.51	NA		
N06	357N010	0.0 - 0.5	1.47	NA	1.02 (J)	NA	1.51	NA	0.87 (J)	NA	0.5	NA		
N07	357N011	NA	1.45	NA	0.91 (J)	NA	1.92	NA	1.17 (J)	NA	0.55	NA		
	357N012	NA	1.61	NA	1.01 (J)	NA	1.66	NA	1.02 (J)	NA	0.48	NA		
N08	357N013	NA	1.35	NA	1 (J)	NA	1.74	NA	1.25 (J)	NA	0.4	NA		

Table D.1-51
Soil Sample Results for Gamma-Emitting Radionuclides Detected
Above Minimum Detectable Concentrations at CAS 25-15-01, Waste Dump
(Page 2 of 2)

			Contaminants of Potential Concern (pCi/g)														
Sample Location	Sample Number	Depth (ft bgs)	Actinium-228			Bismuth-214			Lead-212			Lead-214			Thallium-208		
Final Action Levels			5 ^a	15 ^a		5 ^a	15 ^a		5 ^a	15 ^a		5 ^a	15 ^a		5 ^a	15 ^a	
Depth bgs (cm)			<15	>15		<15	>15		<15	>15		<15	>15		<15	>15	
N09	357N014	NA	1.37	NA		1.11 (J)	NA		1.89	NA		1.05 (J)	NA		0.56	NA	
N10	357N015	NA	1.3	NA		0.93 (J)	NA		1.69	NA		1.04 (J)	NA		0.57	NA	

^aTaken from the generic guidelines for residual concentrations of actinium-228, bismuth-214, lead-212, lead-214, and thallium-208, as found in Chapter IV of DOE Order 5400.5, Change 2, "Radiation Protection of the Public and Environment," (DOE, 1993). The PALs for these isotopes is specified as 5 pCi/g averaged over the first 15 cm of soil and 15 pCi/g for deeper soils (DOE, 1993). For purposes of this document, 15 cm is assumed to be equivalent to 0.5 ft (6 inches); therefore, 5 pCi/g represents the PALs for these radionuclides in the surface soil (0 to 0.5 ft depth).

^bQualifier added to laboratory data; record accepted. Sample does not meet counting geometry requirements.

ft bgs = Feet below ground surface

cm = Centimeter

pCi/g = Picocuries per gram

> = Greater than

< = Less than

G = Sample density differs by more than 15% of laboratory control sample density.

J = Estimated value.

NA = Not applicable

Table D.1-52
Soil Sample Results for Isotopes Detected Above
Minimum Detectable Concentrations at CAS 25-15-01, Waste Dump

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (pCi/g)		
			Uranium-234	Uranium-235	Uranium-238
Final Action Levels			85.9 ^a	10.5 ^a	63.2 ^a
N01	357N001	0.0 - 0.5	0.93	0.034 (LT)	0.8
N02	357N004	14.0 - 15.0	1.01	--	0.92
N03	357N005	0.0 - 0.5	0.85	--	0.8
	357N006	19.0 - 20.0	1.91	0.079	1.76
N04	357N007	0.0 - 0.5	1.09	0.051	1.04
	357N008	1.5 - 2.0	1.08	--	1.01
N05	357N009	0.0 - 0.5	0.86	--	0.81
N06	357N010	0.0 - 0.5	0.87	--	0.75
N07	357N011	NA	1	0.068	1.01
	357N012	NA	1.01	--	0.98
N08	357N013	NA	1.1	0.075	0.92
N09	357N014	NA	0.95	--	0.97
N10	357N015	NA	0.89	0.083	0.95

^aTaken from the construction, commercial, industrial land use scenario in Table 2.1 of the NCRP Report No. 129 *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 15-mrem/yr dose.

ft bgs = Feet below ground surface

pCi/g = Picocuries per gram

LT = Result is less than the requested minimum detectable concentration, greater than the sample specific minimum detectable concentration.

-- = Not detected above minimum reporting limits

D.1.0 References

DOE, see U.S. Department of Energy.

EPA, see U.S. Environmental Protection Agency.

Moore, J., Science Applications International Corporation. 1999. Memorandum to M. Todd (SAIC) entitled, "Background Concentrations for NTS and TTR Soil Samples, 3 February." Las Vegas, NV.

NAC, see *Nevada Administrative Code*.

NBMG, see Nevada Bureau of Mines and Geology.

NCRP, see National Council on Radiation Protection and Measurements.

National Council on Radiation Protection and Measurements. 1999. *Recommended Screening Limits for Contaminated Surface Soil and Review of Factors Relevant to Site-Specific Studies*, Report No. 129. Bethesda, MD.

Nevada Administrative Code. 2002. NAC 444.842 to 444.9809, "Management of Hazardous Waste." Carson City, NV.

Nevada Bureau of Mines and Geology. 1998. *Mineral and Energy Resource Assessment of the Nellis Air Force Range*, Open-File Report 98-1. Reno, NV.

U.S. Department of Energy. 1993. DOE Order 5400.5, Change 2, "Radiation Protection of the Public and the Environment." Washington, DC: U.S. Government Printing Office.

U.S. Environmental Protection Agency. 2002. *Region 9 Preliminary Remediation Goals (PRGs)*. As accessed at www.epa.gov/region09/waste/sfund/prg/index.htm on 8 January 2003.

Appendix E

Waste Disposition Documentation for CAU 357

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039.

UNIFORM HAZARDOUS WASTE MANIFEST		1. Generator's US EPA ID No. N V 3 8 9 0 0 9 0 0 0 1		Manifest Document No. 0 5 0 1 3		2. Page 1 of 2		Information in the shaded areas is not required by Federal law.					
3. Generator's Name and Mailing Address Bechtel Nevada for US DOE PO Box 98521 M/S NTS110 Las Vegas, NV 89193						A. State Manifest Document Number							
4. Generator's Phone (702) 295 - 0311 ATTN: Harry Perry						B. State Generator's ID							
5. Transporter 1 Company Name CAST Transportation						C. State Transporter's ID							
6. US EPA ID Number C O R 0 0 0 0 0 5 3 8 9						D. Transporter's Phone (800) 369-5374							
7. Transporter 2 Company Name						E. State Transporter's ID							
8. US EPA ID Number						F. Transporter's Phone							
9. Designated Facility Name and Site Address Envirocare of Utah, Inc. Clive Disposal Site (Treatment Facility) Interstate 80, Exit 49; Clive, UT 84029.						G. State Facility's ID							
10. US EPA ID Number U T D 9 8 2 5 9 8 8 9 8						H. Facility's Phone (435) 884 - 0155							
11. US DOT Description (Including Proper Shipping Name, Hazard Class and ID Number)						12. Containers		13. Total Quantity		14. Unit Wt/Vol		15. Waste No.	
						No. Type							
a. UN3321, Waste Radioactive Material, low specific activity (LSA-II), 7, CS137, PU-238, PU-239, SOLID, OXIDE, 20.0 Mbq, fissile excepted. (LEAD)						003 DM		603		K		D008	
b. UN3321, Waste Radioactive Material, low specific activity (LSA-II), 7, CS137, PU-238, PU-239 SOLID, OXIDE, 245.0 Mbq, fissile excepted. (LEAD)						003 CM		8800		K		D008	
c. Total								9403		K			
d.													
J. Additional Descriptions for Materials Listed Above Line a: ERG# 162; profile 9316-03; MEF F05004 Line b: ERG# 162; profile 9316-03; MEF F05004 Utah Permit number: 0310002528 PKG #s, Descriptions, and TID #s; as applicable are on page 2.						K. Handling Codes for Wastes Listed Above							
15. Special Handling Instructions and Additional Information EXCLUSIVE USE SHIPMENT 24-hour emergency contact number (702) 295-0311 collect. Use proper PPE when handling containers. Certificate of Disposal is required.										Shipment ID number: 9316-03-001			
16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations. If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.													
Printed/Typed Name <i>Harry A. Perry</i>						Signature <i>[Signature]</i>				Month Day Year <i>01/01/05</i>			
17. Transporter 1 Acknowledgement of Receipt of Materials													
Printed/Typed Name <i>Conrad L. Hoke</i>						Signature <i>[Signature]</i>				Month Day Year <i>11/15/05</i>			
18. Transporter 2 Acknowledgement of Receipt of Materials													
Printed/Typed Name						Signature				Month Day Year			
19. Discrepancy Indication Space													
20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.													
Printed/Typed Name						Signature				Month Day Year			

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved, OMB No. 2050-0039.

UNIFORM HAZARDOUS WASTE MANIFEST (Continuation Sheet)		21. Generator's US EPA ID No. NV 3890090001	Manifest Document No. 05013	22. Page 2 of 2	Information in the shaded areas is not required by Federal law.
23. Generator's Name Bechtel Nevada for US DOE PO Box 98521 M/S NTS403 Las Vegas, NV 89193 (702) 295 0311 ATTN: Harry Perry		L. State Manifest Document Number		M. State Generator's ID	
24. Transporter Company Name		25. US EPA ID Number		N. State Transporter's ID	
26. Transporter Company Name		27. US EPA ID Number		O. Transporter's Phone	
				P. State Transporter's ID	
				Q. Transporter's Phone	
28. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)		29. Containers	30. Total Quantity	31. Unit Wt/Vol	R. Waste No.
a. PKG# 05M001, Soil, TID# 209444; PKG# 05M002, Soil, TID# 209448; PKG# 05M003, Soil, TID# 209447;		No.	Type		
b. PKG# 141533, Soil, TID# 205245; PKG# 141539, Soil, TID# 001833; PKG# 141537, Soil, TID# 500250;					
c.					
d.					
e.					
f.					
g.					
h.					
i.					
S. Additional Descriptions for Materials Listed Above Line a: ERG# 162; profile 9316-03; MEF F05004 Line b: ERG# 162; profile 9316-03; MEF F05004 Shipment ID number: 9316-03-0001 Utah Permit number: 0310002528			T. Handling Codes for Wastes Listed Above		
32. Special Handling Instructions and Additional Information 24-hour emergency contact number (702) 295-0311 collect. Use proper PPE when handling containers. Certificate of Disposal is required.					
TRANSPORTER	33. Transporter Acknowledgement of Receipt of Materials			Date	
	Printed/Typed Name Conrad L. Hoke			Signature Conrad L. Hoke Month Day Year 11 5 05	
FACILITY	34. Transporter Acknowledgement of Receipt of Materials			Date	
	Printed/Typed Name			Signature Month Day Year	
35. Discrepancy Indication Space					

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EPA Form 8700-22A (Rev. 9-88) Previous editions are obsolete.

ORIGINAL - RETURN TO GENERATOR

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Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039.

UNIFORM HAZARDOUS WASTE MANIFEST		1. Generator's US EPA ID No. N.V.3890090001	Manifest Document No. 05014	2. Page 1 of 2 Information in the shaded areas is not required by Federal law.	
3. Generator's Name and Mailing Address Bechtel Nevada for US DOE PO Box 98521 M/S NTS110 Las Vegas, NV 89193		A. State Manifest Document Number			
4. Generator's Phone (702) 295-0311 ATTN: Harry Perry		B. State Generator's ID			
5. Transporter 1 Company Name CAST Transportation		6. US EPA ID Number COR000005389	C. State Transporter's ID		
7. Transporter 2 Company Name		8. US EPA ID Number	D. Transporter's Phone (800) 389-8374		
9. Designated Facility Name and Site Address Envirocare of Utah, Inc. Clive Disposal Site (Treatment Facility) Interstate 80, Exit 49; Clive, UT. 84029.		10. US EPA ID Number UTD982598898	E. State Transporter's ID		
		F. Transporter's Phone			
		G. State Facility's ID			
		H. Facility's Phone (435) 884-0155			
11. US DOT Description (Including Proper Shipping Name, Hazard Class and ID Number)		12. Containers	13. Total Quantity	14. Unit Wt/Vol	15. Waste No.
a. RQ UN3321, Waste Radioactive Material, low specific activity (LSA-II), 7, CS137, PU-238, PU-239, 250.0 Mbq, fissile excepted.		No. 002	Type CM	7906	K D008
b.					
c. Total				7906	K
d.					
J. Additional Descriptions for Materials Listed Above Line a: ERG# 162; profile 9316-01; MEF F05004 Utah Permit number: 0310002528 PKG #s, Descriptions, and TID #s as applicable are on page 2.		K. Handling Codes for Wastes Listed Above			
15. Special Handling Instructions and Additional Information EXCLUSIVE USE SHIPMENT 24-hour emergency contact number (702) 295-0311 collect. Use proper PPE when handling containers. Certificate of Disposal is required. Shipment ID number: 9316-01-002					
16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations. If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment. OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.					
Printed/Typed Name Harry A. Perry		Signature <i>[Signature]</i>		Month Day Year 10/10/05	
17. Transporter 1 Acknowledgement of Receipt of Materials Printed/Typed Name Conrad L. Hoke		Signature <i>[Signature]</i>		Month Day Year 11/15/05	
18. Transporter 2 Acknowledgement of Receipt of Materials Printed/Typed Name		Signature		Month Day Year	
19. Discrepancy Indication Space					
20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19. Printed/Typed Name					
Signature		Month Day Year			

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UNIFORM HAZARDOUS WASTE MANIFEST (Continuation Sheet)		21. Generator's US EPA ID No. NV 3890090001	Manifest Document No. 05014	22. Page 2 of 2	Information in the shaded areas is not required by Federal law.	
23. Generator's Name Bechtel Nevada for US DOE PO Box 98521 M/S NTS403 Las Vegas, NV 89193 (702) 295 0311 ATTN: Harry Perry				L. State Manifest Document Number		
24. Transporter Company Name				M. State Generator's ID		
25. US EPA ID Number				N. State Transporter's ID		
26. Transporter Company Name				O. Transporter's Phone		
27. US EPA ID Number				P. State Transporter's ID		
				Q. Transporter's Phone		
28. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)				29. Containers	30. Total Quantity	31. Unit Wt/Vol
				No.	Type	R. Waste No.
a.	PKG# 141542, Solids, TID# 500205; PKG# 141542, Solids, TID# 001877					
b.						
c.						
d.						
e.						
f.						
g.						
h.						
i.						
S. Additional Descriptions for Materials Listed Above Line a: ERG# 162, profile 9316-01, MEF F05004 Shipment ID number: 9316-01-002, Utah Permit number: 0310002528.				T. Handling Codes for Wastes Listed Above		
32. Special Handling Instructions and Additional Information 24-hour emergency contact number (702) 295-0311 collect. Use proper PPE when handling containers. Certificate of Disposal is required.						
33. Transporter Acknowledgement of Receipt of Materials				Date		
Printed/Typed Name Carmel L. Hoke				Signature Carmel L. Hoke		Month Day Year 11 5 05
34. Transporter Acknowledgement of Receipt of Materials				Date		
Printed/Typed Name				Signature		Month Day Year
35. Discrepancy Indication Space						

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ORIGINAL - RETURN TO GENERATOR

Apr-21-2005 06:32am From-WASTE OPERATIONS

702-295-4815

T-047 P.001/001 F-952

NTS On-Site HazMat Transfer - Published

Tracking No: ITL05003
Carrier: GOVERNMENT TRUCK
Vehicle:
Driver: CURTIS STEVENS

CDL:

Depart: 14-APR-2005 08:30

Arrival: 14-APR-2005 11:00

From: WILLIAM NICOSIA
STOLLER-NAVARRO
BASE CAMP
MERCURY, NV 89023
Area: 23
Bldg: 0153
Phone: 702-295-7719
Alt Phone:
Pager: 702-794-5628
Mobile:

To: DOUGLAS CLARK
BECHTEL NEVADA
BASE CAMP
MERCURY, NV 89023
Area: 05
Bldg: 07
Phone: 702-295-6688
Alt Phone: 702-254-8611
Pager:
Mobile: 702-523-8036

Entered By: STOLLER

Date Modified: 08-APR-2005

Shipped Material(s)	Package(s)	Unit(s)	Guide No.
UNNA ---, NON-REGULATED WASTE WASTE DRUM 357B02 TID # 0208440	1 DRUM, METAL	320.00 POUND(S) (GROSS)	---

24-Hr Emergency Response Number
702/295-0311

Secondary Emergency Response Contact And/Or Comments
BARBARA QUINN 5-2488

EMERGENCY RESPONSE

By Phone
702-295-0311

By Radio
"MAYDAY - MAYDAY - MAYDAY"

In the event of an incident involving Hazardous Material:

1. Gather HazMat shipping papers and NAER Guidebook
2. Isolate the immediate area
3. Assess the situation:
  - a. Fire, Spill, or Leak?
  - b. People, Property, or the Environment at risk?
4. Contact On-site Emergency Response Personnel
5. Reference On-Site HazMat Transfer Tracking Number

This is to certify that the above-named materials are properly classified, described, packaged, marked, placarded, and labeled and are in proper condition for transportation according to the applicable regulations of the U.S. Department of Transportation. As a signatory I certify that I have been trained and tested to the requirements of 49 CFR, Part 172-700 and is compliant with the NTS OTSD.

Authorized Signature: Will C. Quinn Date: 4-14-05 Time: 0930

Received by: Barbara Quinn Date: 4-14-05 Time: 10:00

UNCONTROLLED When Printed

4/20/05
ETS

Bechtel Nevada		NTS Landfill Load Verification (Waste definitions are available on page 2)	
SWO USE (Circle One Area)		AREA	LANDFILL
For waste characterization, approval, and/or assistance, contact Solid Waste Operation (SWO) at 5-7898.			
REQUIRED: WASTE GENERATOR INFORMATION (This form is for rollofs, dump trucks, and other onsite disposal of materials.)			
Waste Generator: <u>Stoller-Navarro Joint Venture</u>		Phone Number: <u>295-2033</u>	
Location / Origin: <u>CAU 357; Areas 7, 8, 10, 25, NTS (5 Liners)</u>			
Waste Category: (check one)		☐ Commercial ☒ Industrial	
Waste Type: (check one)		☐ NTS ☐ Putrescible ☒ FFACO-onsite ☐ WAC Exception	
		☐ Non-Putrescible ☐ Asbestos Containing Material ☐ FFACO-offsite ☐ Historic DOE/NV	
Pollution Prevention Category: (check one)		☒ Environmental management ☐ Defense Projects ☐ YMP	
		☒ Clean-Up ☐ Routine	
Method of Characterization: (check one)		☒ Sampling & Analysis ☐ Process Knowledge ☐ Contents	
Prohibited Waste at all three NTS landfills: <u>Radioactive waste; RCRA waste; Hazardous waste; Free liquids, PCBs above TSCA regulatory levels-, and Medical wastes (needles, sharps, bloody clothing).</u>			
Additional Prohibited Waste at the Area 9 U10c Landfill: <u>Sewage Sludge; Animal carcasses-, Wet garbage (food waste); and Friable asbestos</u>			
REQUIRED: WASTE CONTENTS ALLOWABLE WASTES Check all allowable wastes that are contained within this load:			
NOTE: Waste disposed at the Area 6 Hydrocarbon Landfill must have come into contact with petroleum hydrocarbons or coolants such as: gasoline (no benzene, lead); jet fuel; diesel fuel; lubricants and hydraulics; kerosene; asphaltic petroleum hydrocarbon; and ethylene glycol.			
Acceptable waste at any NTS landfill:		☐ Paper ☐ Rocks / unaltered geologic materials ☐ Empty containers	
☐ Asphalt ☐ Metal ☐ Wood ☐ Soil ☐ Rubber (excluding tires) ☐ Demolition debris			
☒ Plastic ☐ Wire ☐ Cable ☐ Cloth ☐ Insulation (non-Asbestosform) ☐ Cement & concrete			
☒ Manufactured items: (swamp coolers, furniture, rugs, carpet, electronic components, PPE, etc.)			
Additional waste accepted at the Area 23 Mercury Landfill: ☐ Office waste ☐ Food Waste ☐ Animal Carcasses			
☐ Asbestos: ☐ Friable ☐ Non-Friable (contact SWO if regulated load) Quantity: _____			
Additional waste accepted at the Area 9 U10c Landfill:			
☐ Non-friable asbestos ☐ Drained automobiles and military vehicles ☐ Solid fractions from sand/oil/water separators			
☐ Light ballasts (contact SWO) ☐ Drained fuel filters (gas & diesel) ☐ Deconned Underground and Above Ground			
☐ Hydrocarbons (contact SWO) ☐ Other _____ ☐ Tanks			
Additional waste accepted at the Area 6 Hydrocarbon Landfill:			
☐ Septic sludge ☐ Rags ☐ Drained fuel filters (gas & diesel) ☐ Crushed non-terne plated oil filters			
☐ Plants ☐ Soil ☐ Sludge from sand/oil/water separators ☐ PCBs below 50 parts per million			
REQUIRED: WASTE GENERATOR SIGNATURE			
Initials: _____ (If initialed, no radiological clearance is necessary.)			
The above mentioned waste was generated outside of a Controlled Waste Management Area (CWMA) and to the best of my knowledge, does not contain radiological materials.			
To the best of my knowledge, the waste described above contains only those materials that are allowed for disposal at this site. I have verified this through the waste characterization method identified above a prohibited and allowable waste items.			
Print Name: <u>DAVID SCHROCK</u>		Radiation Survey Release for Waste Disposal RCT Initials ☒ This container/load is free of external radioactive contamination. ☐ This container/load is exempt from survey due to process knowledge and origin. ☐ This container/load is free of radioactive contamination based on radioanalysis. SIGNATURE: <u>James White</u> DATE: <u>4/12/05</u> BN-0646 (05/93)	
Signature: <u>David Schrock</u> Date: <u>3/31/05</u>			
Note: Food waste, office trash and/or animal carcasses are considered not to contain added require a radiological clearance.			
SWO USE ONLY			
Load Weight (net from scale or estimate): <u>600</u>		Signature of Certifier: <u>Robert W. Russell</u>	

4/20/05
ETS

Bechtel Nevada		NTS Landfill Load Verification	
(Waste definitions are available on page 2)			
SWO USE (Circle One Area)		AREA	LANDFILL
For waste characterization, approval, and/or assistance, contact Solid Waste Operation (SWO) at 5-7898.			
REQUIRED: WASTE GENERATOR INFORMATION (This form is for rollofs, dump trucks, and other onsite disposal of materials.)			
Waste Generator: <u>Stoller-Navarro Joint Venture</u>		Phone Number: <u>295-2033</u>	
Location / Origin: <u>CAU 357; Area 8, NTS (Drums 357E02 - 357E23)</u>			
Waste Category: (check one)		☐ Commercial ☒ Industrial	
Waste Type: (check one)		☐ NTS ☐ Putrescible ☒ FFAO-onsite ☐ WAC Exception	
☐ Non-Putrescible		☐ Asbestos Containing Material ☐ FFAO-offsite ☐ Historic DOE/NV	
Pollution Prevention Category: (check one)		☒ Environmental management ☐ Defense Projects ☐ YMP	
Pollution Prevention Category: (check one)		☒ Clean-Up ☐ Routine	
Method of Characterization: (check one)		☒ Sampling & Analysis ☐ Process Knowledge ☐ Contents	
Prohibited Waste at all three NTS landfills: Radioactive waste; RCRA waste; Hazardous waste; Free liquids, PCBs above TSCA regulatory levels-, and Medical wastes (needles, sharps, bloody clothing).			
Additional Prohibited Waste at the Area 9 U10c Landfill: Sewage Sludge; Animal carcasses-, Wet garbage (food waste); and Friable asbestos			
REQUIRED: WASTE CONTENTS ALLOWABLE WASTES Check all allowable wastes that are contained within this load:			
NOTE: Waste disposed at the Area 6 Hydrocarbon Landfill must have come into contact with petroleum hydrocarbons or coolants such as: gasoline (no benzene, lead); jet fuel; diesel fuel; lubricants and hydraulics; kerosene; asphaltic petroleum hydrocarbon; and ethylene glycol.			
Acceptable waste at any NTS landfill:		☐ Paper ☒ Rocks / unaltered geologic materials ☐ Empty containers	
☐ Asphalt ☐ Metal ☐ Wood ☒ Soil ☐ Rubber (excluding tires) ☐ Demolition debris		☒ Plastic ☐ Wire ☐ Cable ☐ Cloth ☐ Insulation (non-Asbestosform) ☐ Cement & concrete	
☐ Manufactured items: (swamp coolers, furniture, rugs, carpet, electronic components, PPE, etc.)			
Additional waste accepted at the Area 23 Mercury Landfill: ☐ Office waste ☐ Food Waste ☐ Animal Carcasses			
☐ Asbestos: ☐ Friable ☐ Non-Friable (contact SWO if regulated load) Quantity: _____			
Additional waste accepted at the Area 9 U10c Landfill:			
☐ Non-friable asbestos ☐ Drained automobiles and military vehicles ☐ Solid fractions from sand/oil/water separators		☐ Light ballasts (contact SWO) ☐ Drained fuel filters (gas & diesel) ☐ Deconned Underground and Above Ground	
☐ Hydrocarbons (contact SWO) ☐ Other _____ ☐ Tanks			
Additional waste accepted at the Area 6 Hydrocarbon Landfill:			
☐ Septic sludge ☐ Rags ☒ Drained fuel filters (gas & diesel) ☐ Crushed non-terne plated oil filters		☐ Plants ☒ Soil ☐ Sludge from sand/oil/water separators ☐ PCBs below 50 parts per million	
REQUIRED: WASTE GENERATOR SIGNATURE			
Initials: _____ (If initialed, no radiological clearance is necessary.)			
The above mentioned waste was generated outside of a Controlled Waste Management Area (CWMA) and to the best of my knowledge, does not contain radiological materials.			
To the best of my knowledge, the waste described above contains only those materi site. I have verified this through the waste characterization method identified above prohibited and allowable waste items.			
Print Name: <u>DAVID SCHROCK</u>		Signature: <u>David Schrock</u> Date: <u>3/31/05</u>	
Note: Food waste, office trash and/or animal carcasses are considered not to contain adde require a radiological clearance.			
SWO USE ONLY			
Load Weight (net from scale or estimate): <u>13,000</u>		Signature of Certifier: <u>Robert W. Russell</u>	

Radiation Survey Release for Waste Disposal	
RCT Initials	
☒	This container/load is free of external radioactive contamination.
☐	This container/load is exempt from survey due to process knowledge and origin.
☐	This container/load is free of radioactive contamination based on radioanalysis.
SIGNATURE: <u>James Schrock</u>	DATE: <u>4/6/05</u>
BN-0646 (09/99)	

02/15/05 15:55 FAX

STOLLER NAVARRO

Bechtel Nevada **NTS Landfill Load Verification**
(Waste definitions are available on page 2)

SWO USE (Circle One Area) AREA **23** **9** **LANDFILL**

For waste characterization, approval, and/or assistance, contact Solid Waste Operation (SWO) at 5-7898.

REQUIRED: WASTE GENERATOR INFORMATION
(This form is for rollofs, dump trucks, and other onsite disposal of materials.)

Waste Generator: Stoller-Navarro Joint Venture Phone Number: 5-2033

Location / Origin: CAU 357, CAS 10-09-02, NTS, Area 10 (1 rolloff)

Waste Category: (check one) ☐ Commercial ☒ Industrial

Waste Type: (check one) ☐ NTS ☐ Putrescible ☒ FFACO-onsite ☐ WAC Exception

☐ Non-Putrescible ☐ Asbestos Containing Material ☐ FFACO-offsite ☐ Historic DOE/NV

Pollution Prevention Category: (check one) ☒ Environmental management ☐ Defense Projects ☐ YMP

Pollution Prevention Category: (check one) ☒ Clean-Up ☐ Routine ☐ Process Knowledge ☐ Contents

Method of Characterization: (check one) ☒ Sampling & Analysis ☐ Process Knowledge ☐ Contents

Prohibited Waste at all three NTS landfills: Radioactive waste; RCRA waste; Hazardous waste; Free liquids; PCBs above TSCA regulatory levels; and Medical wastes (needles, sharps, bloody clothing).

Additional Prohibited Waste at the Area 9 U10c Landfill: Sewage Sludge; Animal carcasses; Wet garbage (food waste); and Friable asbestos

REQUIRED: WASTE CONTENTS ALLOWABLE WASTES
Check all allowable wastes that are contained within this load:

NOTE: Waste disposed at the Area 6 Hydrocarbon Landfill must have come into contact with petroleum hydrocarbons or coolants such as: gasoline (no benzene, lead); jet fuel; diesel fuel; lubricants and hydraulics; kerosene; asphaltic petroleum hydrocarbon; and ethylene glycol.

Acceptable waste at any NTS landfill: ☒ Paper ☒ Rocks / unaltered geologic materials ☒ Empty containers

☐ Asphalt ☒ Metal ☒ Wood ☐ Soil ☐ Rubber (excluding tires) ☐ Demolition debris

☒ Plastic ☒ Wire ☒ Cable ☐ Cloth ☐ Insulation (non-Asbestosform) ☐ Cement & concrete

☒ Manufactured items: (swamp coolers, furniture, rugs, carpet, electronic components, PPE, etc.)

Additional waste accepted at the Area 23 Mercury Landfill: ☐ Office waste ☐ Food Waste ☐ Animal Carcasses

☐ Asbestos: ☐ Friable ☐ Non-Friable (contact SWO if regulated load) Quantity: _____

Additional waste accepted at the Area 9 U10c Landfill:

☐ Non-friable asbestos ☐ Drained automobiles and military vehicles ☐ Solid fractions from sand/oil/water separators

☐ Light ballasts (contact SWO) ☐ Drained fuel filters (gas & diesel) ☐ Deconned Underground and Above Ground

☐ Hydrocarbons (contact SWO) ☐ Other _____ ☐ Tanks

Additional waste accepted at the Area 6 Hydrocarbon Landfill:

☐ Septic sludge ☐ Rags ☐ Drained fuel filters (gas & diesel) ☐ Other _____

☐ Plants ☐ Soil ☐ Sludge from sand/oil/water separators ☐ Crushed non-ferrous plated oil filters

☐ PCBs below 50 parts per million

REQUIRED: WASTE GENERATOR SIGNATURE

Initials: _____ (If initialed, no radiological clearance is necessary.)

The above mentioned waste was generated outside of a Controlled Waste Management Area (CWMA) and to the best of my knowledge, does not contain radiological materials.

To the best of my knowledge, the waste described above contains only those items prohibited and allowable waste items.

Print Name: DAVID SCHROCK

Signature: David Schrock Date: 2-15-05

Note: Food waste, office trash and/or animal carcasses are considered not to contain require a radiological clearance.

SWO USE ONLY

Load Weight (net from scale or estimate): 4800 Signature of Certifier: [Signature]

Radiation Survey Release for Waste Disposal

RCT Initials: _____

☒ This container/load is free of external radioactive contamination.

☐ This container/load is exempt from survey due to process knowledge and origin.

☐ This container/load is free of radioactive contamination based on radiological analysis.

SIGNATURE: [Signature] DATE: 2/15/05

BN-9446 (09/93)

02/15/2005 14:39
02/15/05 15:55 FAX

17022957582

STOLLER NAVARRO

PAGE 05
001/002

123644

Bechtel Nevada		NTS Landfill Load Verification	
(Waste definitions are available on page 2)			
SWO USE (Circle One Area) AREA		LANDFILL	
For waste characterization, approval, and/or assistance, contact Solid Waste Operation (SWO) at 5-7898.			
REQUIRED: WASTE GENERATOR INFORMATION (This form is for rolloffs, dump trucks, and other onsite disposal of materials.)			
Waste Generator: <u>Stoller-Navarro Joint Venture</u>		Phone Number: <u>5-2033</u>	
Location / Origin: <u>CAU 357, CAS 08-08-02, NTS, Area 8 (1 rolloff)</u>			
Waste Category: (check one)		☐ Commercial ☒ Industrial	
Waste Type: (check one)		☐ NTS ☐ Non-Pulverizable ☐ Putrescible ☐ Asbestos Containing Material ☒ FFACO-onsite ☐ FFACO-offsite ☐ WAC Exception ☐ Historic DOE/NV ☐ YMP	
Pollution Prevention Category: (check one)		☒ Environmental management ☐ Defense Projects	
Pollution Prevention Category: (check one)		☒ Clean-Up ☐ Routine	
Method of Characterization: (check one)		☒ Sampling & Analysis ☐ Process Knowledge ☐ Contents	
Prohibited Waste at all three NTS landfills: Radioactive waste; RCRA waste; Hazardous waste; Free liquids; PCBs above TSCA regulatory levels; and Medical wastes (needles, sharps, bloody clothing).			
Additional Prohibited Waste at the Area 9 U10c Landfill: Sewage Sludge; Animal carcasses; Wet garbage (food waste); and Friable asbestos			
REQUIRED: WASTE CONTENTS ALLOWABLE WASTES Check all allowable wastes that are contained within this load:			
NOTE: Waste disposed at the Area 6 Hydrocarbon Landfill must have come into contact with petroleum hydrocarbons or coolants such as: gasoline (no benzene, lead); jet fuel; diesel fuel; lubricants and hydraulics; kerosene; asphaltic petroleum hydrocarbon; and ethylene glycol.			
Acceptable waste at any NTS landfill:			
☐ Asphalt ☒ Metal ☒ Wood ☐ Soil ☒ Plastic ☒ Wire ☒ Cable ☐ Cloth ☐ Insulation (non-Asbestosform) ☒ Manufactured items: (swamp coolers, furniture, rugs, carpet, electronic components, PPE, etc.)			
Additional waste accepted at the Area 23 Mercury Landfill: ☐ Office waste ☐ Food Waste ☐ Animal Carcasses			
Additional waste accepted at the Area 9 U10c Landfill:			
☐ Non-friable asbestos ☐ Drained automobiles and military vehicles ☐ Solid fractions from sand/oil/water separators ☐ Light ballast (contact SWO) ☐ Drained fuel filters (gas & diesel) ☐ Decanned Underground and Above Ground ☐ Hydrocarbons (contact SWO) ☐ Other ☐ Tanks			
Additional waste accepted at the Area 6 Hydrocarbon Landfill:			
☐ Septic sludge ☐ Rags ☐ Drained fuel filters (gas & diesel) ☐ Plants ☐ Soil ☐ Sludge from sand/oil/water separators ☐ Crushed non-ferrous plated oil filters ☐ PCBs below 50 parts per million			
REQUIRED: WASTE GENERATOR SIGNATURE			
Initials: _____ (If Initialed, no radiological clearance is necessary.)			
The above mentioned waste was generated outside of a Controlled Waste Management Area (CWMA) and to the best of my knowledge, does not contain radiological materials.			
To the best of my knowledge, the waste described above contains only those materials I have verified through the waste characterization method identified as prohibited and allowable waste items.			
Print Name: <u>DAVID SCHROCK</u>		Signature: <u>Daniel Schrock</u> Date: <u>2-15-05</u>	
Note: Food waste, office trash and/or animal carcasses are considered not to contain radiological clearance.			
SWO USE ONLY			
Load Weight (net from scale or estimate): <u>4600</u>		Signature of Certifier: <u>[Signature]</u>	

Radiation Survey Release for Waste Disposal	
RCT Initials	
☒	This container/load is free of external radioactive contamination.
☐	This container/load is exempt from survey due to process knowledge and origin.
☐	This container/load is free of radioactive contamination based on radioanalysis.
SIGNATURE: <u>[Signature]</u>	DATE: <u>2/15/05</u> BN-0026 (03/03)

Table E.1-1
Waste Management Sample Result Detected
Above Minimum Reporting Limits at CAS 08-09-01, Mud Pit

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Units
E04	357E006	Liquid	TCLP Lead	0.27	mg/L

mg/L = Milligrams per liter

Table E.1-2
Waste Management Soil Sample Results Detected
Above Minimum Reporting Limits at CAS 08-03-03, Mud Pit

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Units
Pipe #3	357G501	Soil	Actinium-228	1.5 (G)	pCi/g
		Soil	Bismuth-214	1.08 (G)	pCi/g
		Soil	Cesium-137	16.9 (G)	pCi/g
		Soil	Cobalt-60	0.45 (G)	pCi/g
		Soil	Lead-212	1.58 (J) ^a	pCi/g
		Soil	Lead-214	0.92 (G, J)	pCi/g
		Soil	Thallium-208	0.47 (G)	pCi/g
		Soil	Plutonium-238	0.064	pCi/g
		Soil	Plutonium-239	0.9	pCi/g
		Soil	Uranium-234	0.94	pCi/g
		Soil	Uranium-235	0.065	pCi/g
		Soil	Uranium-238	1	pCi/g
		Soil	Acetone	55 (J)	µg/kg
Pipe #4	357G502	Soil	Actinium-228	2.08 (G)	pCi/g
		Soil	Bismuth-214	1.12 (G, J)	pCi/g
		Soil	Cesium-137	3.25 (G)	pCi/g
		Soil	Lead-212	2.45 (J) ^a	pCi/g
		Soil	Lead-214	1.1 (G, J)	pCi/g
		Soil	Thallium-208	0.54 (G)	pCi/g
		Soil	Plutonium-239	0.148	pCi/g
		Soil	Uranium-234	1	pCi/g
		Soil	Uranium-235	0.067	pCi/g
		Soil	Uranium-238	1.01	pCi/g

^aQualifier added to laboratory data; record accepted. Sample does not meet counting geometry requirements.

pCi/g = Picocuries per gram

µg/kg = Micrograms per kilogram

G = Sample density differs by more than 15% of laboratory control sample density.

J = Estimated value.

Note: Soil samples collected from Pipe #3 and Pipe #4 were in support of housekeeping activities and debris removal.

Table E.1-3
Waste Management Sample Results Detected
Above Minimum Reporting Limits at CAS 10-09-02, Mud Pit
(Page 1 of 2)

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Units
Soil from Tarps at Mud Pit A	357H501	Soil	Actinium-228	1.35 (G)	pCi/g
		Soil	Bismuth-214	0.9 (G, J)	pCi/g
		Soil	Cesium-137	0.77 (G)	pCi/g
		Soil	Lead-212	1.29 (J) ^a	pCi/g
		Soil	Lead-214	0.94 (G, J)	pCi/g
		Soil	Thallium-208	0.41 (G)	pCi/g
		Soil	Plutonium-238	0.216	pCi/g
		Soil	Plutonium-239	1.27	pCi/g
		Soil	Uranium-234	1.02	pCi/g
		Soil	Uranium-238	0.95	pCi/g
		Soil	Arsenic	5.9	mg/kg
		Soil	Barium	220	mg/kg
		Soil	Beryllium	0.75	mg/kg
		Soil	Chromium	9.1	mg/kg
		Soil	Cobalt	5.2	mg/kg
		Soil	Copper	11	mg/kg
		Soil	Lead	29	mg/kg
		Soil	Nickel	13	mg/kg
		Soil	Selenium	0.9 (J) ^b	mg/kg
		Soil	Vanadium	15	mg/kg
		Soil	Zinc	53 (J) ^c	mg/kg

Table E.1-3
Waste Management Sample Results Detected
Above Minimum Reporting Limits at CAS 10-09-02, Mud Pit
(Page 2 of 2)

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Units
Soil from Tarps at Mud Pit B	357H502	Soil	Actinium-228	1.38 (G)	pCi/g
		Soil	Bismuth-214	0.82 (G, J)	pCi/g
		Soil	Cesium-137	1.98 (G)	pCi/g
		Soil	Lead-212	1.45 (J) ^a	pCi/g
		Soil	Lead-214	0.87 (G, J)	pCi/g
		Soil	Thallium-208	0.53 (G)	pCi/g
		Soil	Plutonium-238	0.276	pCi/g
		Soil	Plutonium-239	1.81	pCi/g
		Soil	Uranium-234	0.98	pCi/g
		Soil	Uranium-238	0.99	pCi/g
		Soil	Arsenic	5.8	mg/kg
		Soil	Barium	200	mg/kg
		Soil	Beryllium	0.74	mg/kg
		Soil	Chromium	7	mg/kg
		Soil	Cobalt	3.7	mg/kg
		Soil	Copper	10	mg/kg
		Soil	Lead	10	mg/kg
		Soil	Nickel	14	mg/kg
		Soil	Selenium	0.59 (J) ^b	mg/kg
		Soil	Vanadium	16	mg/kg
		Soil	Zinc	48 (J) ^c	mg/kg

^aQualifier added to laboratory data; record accepted. Sample does not meet counting geometry requirements.

^bQualifier added to laboratory data; record accepted. Value <5 times contamination in continuing calibration/method blank. CRI/CRA % recovery(ies) criteria was/were not met.

^cQualifier added to laboratory data; record accepted. Serial dilution %D outside control limits. Matrix effects may exist.

mg/kg = Milligrams per kilogram

pCi/g = Picocuries per gram

G = Sample density differs by more than 15% of laboratory control sample density.

J = Estimated value.

Table E.1-4
Waste Management Sample Results Detected
Above Minimum Reporting Limits at CAS 04-26-03
(Page 1 of 4)

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Units
M09	357M501	Soil	Americium-241	81 (J) ^a	pCi/g
		Soil	Cobalt-60	1.24 (G)	pCi/g
		Soil	Cesium-137	112 (G)	pCi/g
		Soil	Europium-152	53.2 (G)	pCi/g
		Soil	Lead-212	1.44 (J) ^a	pCi/g
		Soil	Plutonium-238	96 (M3)	pCi/g
		Soil	Plutonium-239	332 (M3)	pCi/g
		Soil	Strontium-90	18.9 (M3)	pCi/g
		Soil	Uranium-234	2.06 (M3)	pCi/g
		Soil	Uranium-238	1.19 (M3)	pCi/g
M10	357M502	Soil	Americium-241	71.3 (J) ^a	pCi/g
		Soil	Cobalt-60	1.28 (G)	pCi/g
		Soil	Cesium-137	107 (G, M3)	pCi/g
		Soil	Europium-152	62.2 (G)	pCi/g
		Soil	Lead-212	1.77 (J) ^a	pCi/g
		Soil	Plutonium-238	93 (M3)	pCi/g
		Soil	Plutonium-239	318 (M3)	pCi/g
		Soil	Strontium-90	17.3 (M3)	pCi/g
		Soil	Uranium-234	1.81 (M3)	pCi/g
		Soil	Uranium-238	1.07 (M3)	pCi/g
Drum 357M01	357M503	Soil	Americium-241	60.8 (J) ^a	pCi/g
		Soil	Cobalt-60	1.19 (G)	pCi/g
		Soil	Cesium-137	81.2 (G)	pCi/g
		Soil	Europium-152	72.4 (G)	pCi/g
		Soil	Europium-154	4 (G, TI)	pCi/g
		Soil	Lead-212	1.69 (J) ^a	pCi/g
		Soil	Lead-214	1.37 (G, J)	pCi/g
		Soil	Plutonium-238	78 (M3)	pCi/g
		Soil	Plutonium-239	276 (M3)	pCi/g
		Soil	Strontium-90	22.3 (M3)	pCi/g
		Soil	Uranium-234	2.11 (M3)	pCi/g
		Soil	Uranium-238	1.1 (M3)	pCi/g
		Liquid	TCLP Lead	80	mg/L
	357M506	Soil	PH	8.3 (J) ^b	PH
		Soil	Paint Filter Test	Pass	None

Table E.1-4
Waste Management Sample Results Detected
Above Minimum Reporting Limits at CAS 04-26-03
(Page 2 of 4)

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Units
Drum 357M02	357M504	Soil	Americium-241	164 (J) ^a	pCi/g
		Soil	Cobalt-60	2.44 (G)	pCi/g
		Soil	Cesium-137	171 (G, M3)	pCi/g
		Soil	Europium-152	104 (G)	pCi/g
		Soil	Europium-154	7.1 (G, TI)	pCi/g
		Soil	Plutonium-238	256 (M3)	pCi/g
		Soil	Plutonium-239	850 (M3)	pCi/g
		Soil	Strontium-90	61	pCi/g
		Soil	Uranium-234	1.57 (M3)	pCi/g
		Soil	Uranium-238	1.14 (M3)	pCi/g
		Liquid	TCLP Lead	210	mg/L
	357M507	Soil	PH	8 (J) ^b	PH
		Soil	Paint Filter Test	Pass	None
Drum 357M03	357M505	Soil	Americium-241	97 (J) ^a	pCi/g
		Soil	Cobalt-60	1.68 (G)	pCi/g
		Soil	Cesium-137	118 (G, M3)	pCi/g
		Soil	Europium-152	78.4 (G)	pCi/g
		Soil	Europium-154	5.3 (G, TI)	pCi/g
		Soil	Lead-212	1.48 (J) ^a	pCi/g
		Soil	Plutonium-238	132 (M3)	pCi/g
		Soil	Plutonium-239	437 (M3)	pCi/g
		Soil	Strontium-90	42 (M3)	pCi/g
		Soil	Uranium-234	2.32 (M3)	pCi/g
		Soil	Uranium-235	0.27 (M3)	pCi/g
		Soil	Uranium-238	1.34 (M3)	pCi/g
		Liquid	TCLP Lead	220	mg/L
	357M508	Soil	PH	8.2 (J) ^b	PH
		Soil	Paint Filter Test	Pass	None

Table E.1-4
Waste Management Sample Results Detected
Above Minimum Reporting Limits at CAS 04-26-03
(Page 3 of 4)

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Units
Box 357M05	357M509	Soil	Americium-241	99 (J) ^a	pCi/g
		Soil	Cobalt-60	1.62 (G)	pCi/g
		Soil	Cesium-137	113 (G, M3)	pCi/g
		Soil	Europium-152	71.1 (J) ^a	pCi/g
		Soil	Lead-212	1.79 (J) ^a	pCi/g
		Soil	Plutonium-238	115 (M3)	pCi/g
		Soil	Plutonium-239	391	pCi/g
		Soil	Strontium-90	50 (M3)	pCi/g
		Soil	Uranium-234	1.41 (M3)	pCi/g
		Soil	Uranium-235	0.056	pCi/g
		Soil	Uranium-238	1.26	pCi/g
		Soil	PH	8.4 (J) ^b	PH
		Soil	Paint Filter Test	Pass	None
		Liquid	TCLP Lead	110	mg/L
Box 357M07	357M510	Soil	Americium-241	110	pCi/g
		Soil	Cobalt-60	1.23	pCi/g
		Soil	Cesium-137	111 (M3)	pCi/g
		Soil	Europium-152	57.5	pCi/g
		Soil	Lead-212	0.98	pCi/g
		Soil	Plutonium-238	133 (M3)	pCi/g
		Soil	Plutonium-239	447	pCi/g
		Soil	Strontium-90	63 (M3)	pCi/g
		Soil	Uranium-234	1.55 (M3)	pCi/g
		Soil	Uranium-238	1 (M3)	pCi/g
		Soil	Bis(2-Ethylhexyl)Phthalate	710 (J) ^c	µg/kg
		Soil	PH	8.5 (J) ^b	PH
		Soil	Paint Filter Test	Pass	None
		Liquid	TCLP Lead	120	mg/L

Table E.1-4
Waste Management Sample Results Detected
Above Minimum Reporting Limits at CAS 04-26-03
(Page 4 of 4)

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Units
Box 357M08	357M511	Soil	Americium-241	60.1 (J) ^a	pCi/g
		Soil	Cobalt-60	1.55 (G)	pCi/g
		Soil	Cesium-137	111 (G)	pCi/g
		Soil	Europium-152	106 (J) ^a	pCi/g
		Soil	Europium-154	3.9 (G, TI)	pCi/g
		Soil	Lead-212	1.86 (J) ^a	pCi/g
		Soil	Plutonium-238	68 (M3)	pCi/g
		Soil	Plutonium-239	292 (M3)	pCi/g
		Soil	Strontium-90	15.5 (J)	pCi/g
		Soil	Uranium-234	1.75 (M3)	pCi/g
		Soil	Uranium-238	0.77 (M3)	pCi/g
		Soil	PH	8.2 (J) ^b	PH
		Soil	Paint Filter Test	Pass	None
		Liquid	TCLP Lead	3.9	mg/L
	357M512	Soil	Americium-241	81 (J) ^a	pCi/g
		Soil	Cobalt-60	1.68 (G)	pCi/g
		Soil	Cesium-137	61.7 (G, M3)	pCi/g
		Soil	Europium-152	108 (J) ^a	pCi/g
		Soil	Lead-212	1.9 (J) ^a	pCi/g
		Soil	Plutonium-238	118 (M3)	pCi/g
		Soil	Plutonium-239	395 (M3)	pCi/g
		Soil	Strontium-90	30.6 (J)	pCi/g
		Soil	Uranium-234	1.47 (M3)	pCi/g
		Soil	Uranium-238	1.18	pCi/g
		Soil	PH	8.5 (J) ^b	PH
		Soil	Paint Filter Test	Pass	None
		Liquid	TCLP Lead	40	mg/L

^aQualifier added to laboratory data; record accepted. Sample does not meet counting geometry requirements.

^bQualifier added to laboratory data; record accepted. Exceeded holding time.

^cQualifier added to laboratory data; record accepted. Matrix effects may exist. Internal area response show extremely low count.

pCi/g = Picocuries per gram

µg/kg = Micrograms per kilogram

G = Sample density differs by more than 15% of laboratory control sample density.

J = Estimated value.

M3 = The requested minimum detectable concentration was not met, but the reported activity is greater than the reported minimum detectable concentration.

TI = Tentatively identified

Appendix F

**Modifications to the Post-Closure Plan
for CAU 357**

F.1.0 Modifications to the Post-Closure Plan

There are no modifications to the Post-Closure Plan.

Appendix G

Use Restrictions for CAU 357

CAU Use Restriction Information

CAU**Number/Description:** CAU 357, Mud Pits and Waste Dump**Applicable CAS Numbers/Descriptions:** CAS 10-09-06, Mud Pit; Stains; Material**Contact (organization/project):** NNSA/NSO Industrial Sites Project Manager**Surveyed Area (UTM, Zone 11, NAD 27, meters):** _____North Corner: N=4114101.99 E=581973.61West Corner: N=4114083.52 E=581937.80South Corner: N=4114027.01 E=581975.68East Corner: N=4114049.20 E=582009.29**Survey Date:** August 2004 **Survey Method (GPS, etc):** GPS**Site Monitoring Requirements:** Inspection of fence and postings.**Required Frequency (quarterly, annually?):** Annually**If Monitoring Has Started, Indicate last Completion Date:** Not Applicable

Use Restrictions

The future use of any land related to this Corrective Action Unit (CAU), as described by the above surveyed location, is restricted from any DOE or Air Force activity that may alter or modify the containment control as approved by the state and identified in the CAU Closure Report or other CAU documentation unless appropriate concurrence is obtained in advance.

Comments: See the Closure Report for additional information on the condition of the site(s) and any monitoring and/or inspection requirements.**Submitted By:** Jasine Curtis **Date:** 4-20-05**cc with copy of survey map (paper and digital (dgn) formats):**
CAU Files (2 copies)

Figure G.1-1
CAU 357, Mud Pits and Waste Dump,
CAS 10-09-06 Land Use Restriction Boundary

CAU Use Restriction Information

CAU**Number/Description:** CAU 357, Mud Pits and Waste Dump**Applicable CAS Numbers/Descriptions:** CAS 04-26-03, Lead Bricks**Contact (organization/project):** NNSA/NSO Industrial Sites Project Manager**Surveyed Area (UTM, Zone 11, NAD 27, meters):** _____North Corner: N=4105671.50 E=579705.00East Corner: N=4105654.60 E=579723.90South Corner: N=4105631.00 E=579709.60West Corner: N=4105635.30 E=579680.50**Survey Date:** August 2004 **Survey Method (GPS, etc):** GPS**Site Monitoring Requirements:** Inspection of postings.**Required Frequency (quarterly, annually?):** Annually**If Monitoring Has Started, Indicate last Completion Date:** Not Applicable

Use Restrictions

The future use of any land related to this Corrective Action Unit (CAU), as described by the above surveyed location, is restricted from any DOE or Air Force activity that may alter or modify the containment control as approved by the state and identified in the CAU Closure Report or other CAU documentation unless appropriate concurrence is obtained in advance.

Comments: See the Closure Report for additional information on the condition of the site(s) and any monitoring and/or inspection requirements.**Submitted By:** Sabina Curtis **Date:** 4-20-05**cc with copy of survey map (paper and digital (dgn) formats):**
CAU Files (2 copies)

CAU Use Restriction Information

CAU

Number/Description: CAU 357, Mud Pits and Waste Dump

Applicable CAS Numbers/Descriptions: CAS 25-15-01, Waste Dump

Contact (organization/project): NNSA/NSO Industrial Sites Project Manager

Surveyed Area (UTM, Zone 11, NAD 27, meters): _____

North Corner: N=4075238.00 E=567652.60

Northeast Corner: N=4075226.90 E=567674.20

East Corner: N=4075186.30 E=567686.20

South Corner: N=4075174.20 E=567664.80

West Corner: N=4075199.00 E=567628.40

Survey Date: August 2004 **Survey Method (GPS, etc):** GPS

Site Monitoring Requirements: Inspection of monuments and for land subsidence.

Required Frequency (quarterly, annually?): Annually

If Monitoring Has Started, Indicate last Completion Date: Not Applicable

Use Restrictions

The future use of any land related to this Corrective Action Unit (CAU), as described by the above surveyed location, is restricted from any DOE or Air Force activity that may alter or modify the containment control as approved by the state and identified in the CAU Closure Report or other CAU documentation unless appropriate concurrence is obtained in advance.

Comments: See the Closure Report for additional information on the condition of the site(s) and any monitoring and/or inspection requirements.

Submitted By: Sabine Curtis **Date:** 4-20-05

cc with copy of survey map (paper and digital (dgn) formats):
CAU Files (2 copies)

Appendix H

Visual Sample Plan Calculation Results for CAU 357, CAS 07-09-03

CAU 357 CAS 07-09-03 Both Mudpits

Random sampling locations for comparing a mean with a fixed threshold (nonparametric)

Summary

This report summarizes the sampling design used, associated statistical assumptions, as well as general guidelines for conducting post-sampling data analysis. Sampling plan components presented here include how many sampling locations to choose and where within the sampling area to collect those samples. The type of medium to sample (i.e., soil, groundwater, etc.) and how to analyze the samples (in-situ, fixed laboratory, etc.) are addressed in other sections of the sampling plan.

The following table summarizes the sampling design developed. A figure that shows sampling locations in the field and a table that lists sampling location coordinates are also provided below.

SUMMARY OF SAMPLING DESIGN	
Primary Objective of Design	Compare a site mean or median to a fixed threshold
Type of Sampling Design	Nonparametric
Sample Placement (Location) in the Field	Simple random sampling
Working (Null) Hypothesis	The median(mean) value at the site exceeds the threshold
Formula for calculating number of sampling locations	Wilcoxon signed ranks test
Calculated total number of samples	15
Number of samples on map ^a	15
Number of selected sample areas ^b	1
Specified sampling area ^c	8166.71 ft ²
Total cost of sampling ^d	\$8500.00

^a This number may differ from the calculated number because of 1) grid edge effects, 2) adding judgment samples, or 3) selecting or unselecting sample areas.

^b The number of selected sample areas is the number of colored areas on the map of the site. These sample areas contain the locations where samples are collected.

^c The sampling area is the total surface area of the selected colored sample areas on the map of the site.

^d Including measurement analyses and fixed overhead costs. See the Cost of Sampling section for an explanation of the costs presented here.

Area 1					
X Coord	Y Coord	Label	Value	Type	Historical
584923.3205	4106736.9019		0	Random	
584906.9421	4106672.4353		0	Random	
584964.2665	4106516.0439		0	Random	
585013.4017	4106494.5550		0	Random	
584911.0367	4106720.1884		0	Random	
584919.2259	4106634.2328		0	Random	
584892.6110	4106763.1661		0	Random	
584958.1246	4106487.3921		0	Random	
584925.3678	4106584.0921		0	Random	
584994.9760	4106508.8809		0	Random	
584913.0840	4106605.5809		0	Random	
584945.8408	4106541.1143		0	Random	
584904.8948	4106734.5143		0	Random	
584924.3442	4106555.4402		0	Random	
584907.9658	4106748.8402		0	Random	

Primary Sampling Objective

The primary purpose of sampling at this site is to compare a median or mean value with a fixed threshold. The working hypothesis (or 'null' hypothesis) is that the median(mean) value at the site is equal to or exceeds the threshold. The alternative hypothesis is that the median(mean) value is less than the threshold. VSP calculates the number of samples required to reject the null hypothesis in favor of the alternative one, given a selected sampling approach and inputs to the associated equation.

Selected Sampling Approach

A nonparametric random sampling approach was used to determine the number of samples and to specify sampling locations. A nonparametric formula was chosen because the conceptual model and historical information (e.g., historical data from this site or a very similar site) indicate that typical parametric assumptions may not be true.

Both parametric and non-parametric equations rely on assumptions about the population. Typically, however, non-parametric equations require fewer assumptions and allow for more uncertainty about the statistical distribution of values at the site. The trade-off is that if the parametric assumptions are valid, the required number of samples is usually less than if a non-parametric equation was used.

Locating the sample points randomly provides data that are separated by many distances, whereas systematic samples are all equidistant apart. Therefore, random sampling provides more information about the spatial structure of the potential contamination than systematic sampling does. As with systematic sampling, random sampling also provides information regarding the mean value, but there is the possibility that areas of the site will not be represented with the same frequency as if uniform grid sampling were performed.

Number of Total Samples: Calculation Equation and Inputs

The equation used to calculate the number of samples is based on a Wilcoxon Signed Ranks test. For this site, the null hypothesis is rejected in favor of the alternative one if the sample median(mean) is sufficiently smaller than the threshold. The number of samples to collect is calculated so that if the inputs to the equation are true, the calculated number of samples will cause the null hypothesis to be rejected.

The formula used to calculate the number of samples is:

$$n = 1.16 \left[\frac{\left(S_{sample}^2 + \frac{S_{analytical}^2}{r} \right)}{\Delta^2} (Z_{1-\alpha} + Z_{1-\beta})^2 + 0.5 Z_{1-\alpha}^2 \right]$$

where

- n is the number of samples,
- S is the estimated standard deviation of the measured values including analytical error,
- Δ is the width of the gray region,
- α is the acceptable probability of incorrectly concluding the site median(mean) is less than the threshold,
- β is the acceptable probability of incorrectly concluding the site median(mean) exceeds the threshold,
- $Z_{1-\alpha}$ is the value of the standard normal distribution such that the proportion of the distribution less than $Z_{1-\alpha}$ is $1-\alpha$,
- $Z_{1-\beta}$ is the value of the standard normal distribution such that the proportion of the distribution less than $Z_{1-\beta}$ is $1-\beta$.

The values of these inputs that result in the calculated number of sampling locations are:

Parameter	Value
S	10
Δ	8.8
α	5%
β	10%
$Z_{1-\alpha}$	1.64485 ^a
$Z_{1-\beta}$	1.28155 ^b

^a This value is automatically calculated by VSP based upon the user defined value of α .

^b This value is automatically calculated by VSP based upon the user defined value of β .

The following figure is a performance goal diagram, described in EPA's QA/G-4 guidance (EPA, 2000). It shows the probability of concluding the sample area is dirty on the vertical axis versus a range of possible true median(mean) values for the site on the horizontal axis. This graph contains all of the inputs to the number of samples equation and pictorially represents the calculation.

The red vertical line is shown at the threshold (action limit) on the horizontal axis. The width of the gray shaded area is equal to Δ ; the upper horizontal dashed blue line is positioned at $1-\alpha$ on the vertical axis; the lower horizontal dashed blue line is positioned at β on the vertical axis. The vertical green line is positioned at one standard deviation below the threshold. The shape of the red curve corresponds to the estimates of variability. The calculated number of samples results in the curve that passes through the lower bound of Δ at β and the upper bound of Δ at $1-\alpha$. If any of the inputs change, the number of samples that result in the correct curve changes.

Statistical Assumptions

The assumptions associated with the formulas for computing the number of samples are:

1. the data originate from a symmetric (but not necessarily normal) population,
2. the variance estimate, S^2 , is reasonable and representative of the population being sampled,
3. the population values are not spatially or temporally correlated, and
4. the sampling locations will be selected randomly.

The first three assumptions will be assessed in a post data collection analysis. The last assumption is valid because the sample locations were selected using a random process.

Sensitivity Analysis

The sensitivity of the calculation of number of samples was explored by varying s, LBGR, β and α and examining the resulting changes in the number of samples. The following table shows the results of this analysis.

AL=100		Number of Samples					
		$\alpha=5$		$\alpha=10$		$\alpha=15$	
		s=20	s=10	s=20	s=10	s=20	s=10
LBGR=90	$\beta=5$	52	15	41	11	34	9
	$\beta=10$	42	12	32	9	26	7
	$\beta=15$	35	10	26	8	21	6
LBGR=80	$\beta=5$	15	5	11	4	9	3
	$\beta=10$	12	5	9	3	7	3
	$\beta=15$	10	4	8	3	6	2
LBGR=70	$\beta=5$	8	3	6	3	5	2
	$\beta=10$	6	3	5	2	4	2
	$\beta=15$	6	3	4	2	3	2

s = Standard Deviation

LBGR = Lower Bound of Gray Region (% of Action Level)

β = Beta (%), Probability of mistakenly concluding that $\mu >$ action level

α = Alpha (%), Probability of mistakenly concluding that $\mu <$ action level

AL = Action Level (Threshold)

Recommended Data Analysis Activities

Post data collection activities generally follow those outlined in EPA's Guidance for Data Quality Assessment (EPA, 2000). The data analysts will become familiar with the context of the problem and goals for data collection and assessment. The data will be verified and validated before being subjected to statistical or other analyses. Graphical and analytical tools will be used to verify to the extent possible the assumptions of any statistical analyses that are performed as well as to achieve a general understanding of the data. The data will be assessed to determine whether they are adequate in both quality and quantity to support the primary objective of sampling.

Because the primary objective for sampling for this site is to compare the site median(mean) value with a threshold value, the data will be assessed in this context. Assuming the data are adequate, at least one statistical test will be done to perform a comparison between the data and the threshold of interest. Results of the exploratory and quantitative assessments of the data will be reported, along with conclusions that may be supported by them.

Appendix I

Residual Radiation (RESRAD) Computer Code Calculation Results for CAU 357

Residual Radioactive Material
Guidelines for CAS 08-09-03

Derivation of Residual Radioactive Material Guidelines for Radionuclides in Soil at the
Corrective Action Site (CAS) 08-09-03 of the Corrective Action Unit (CAU) 357, Mud Pits
and Waste Dump, Nevada Test Site, Nevada

February 1, 2005

Work sponsored by U.S. Department of Energy, National Nuclear Security Administration
Nevada Site Office, Environmental Restoration Division, Las Vegas, Nevada.

Introduction

Residual radioactive material guidelines for fission products, activation products, and uranium isotopes were derived for CAS 08-09-03 located in Area 8 of the NTS. This site became contaminated with fission products, activation products, and isotopes of uranium and plutonium from drilling activities conducted in support of underground nuclear weapons testing at the NTS. Radionuclide-specific guidelines were derived to meet the requirement that the total effective dose equivalent (TEDE) to a hypothetical individual working in the identified areas of contamination at this CAS should not exceed an annual dose of 25 mrem/yr.

The TEDE is defined as the sum of the effective dose equivalent (EDE) from external radiation and the committed effective dose equivalent (CEDE) from internal radiation. A dose equivalent is the radiation dose absorbed by a tissue multiplied by a dimensionless quality factor that represents the biological effectiveness of the radiation type (i.e., alpha particles, photons) for causing stochastic biological effects such as cancer or heredity effects. The EDE is the weighted sum of the dose equivalents to different organs and tissues, where the weighing factor is the ratio of the stochastic risk for an individual tissue to the total stochastic risk for all tissue following whole body irradiation. The CEDE is the dose equivalent to organs and tissues that will be received by an individual from an intake of radioactive material during the 50-year period following the intake.

The RESRAD computer code (version 6.22) was developed by Argonne National Laboratory for the DOE. RESRAD implements the dose assessment methodology described in DOE Order 5400.5, "Radiation Protection of the Public and the Environment" (DOE, 1993) and is used to implement residual radioactive material guidelines contained in the order. The exposure scenario selected for this site, which is based on the future land use at the site, indicated that the 25-mrem/yr dose constraint would not be exceeded within 1,000 years for the single radionuclide guidelines. The scenario was chosen based on the consideration of all significant exposures to the critical population group via the following pathways:

- Direct exposure to external radiation from the contaminated soil
- Internal dose from inhalation of airborne radionuclides
- Internal dose from ingestion of contaminated soil

Because sitewide residual radioactive material guidelines for fission products, activation products, and isotopes of uranium, plutonium, and americium have not been established for the NTS, guidelines for this CAS have been derived on a site-specific basis. The derived guidelines represent the residual concentrations of the following radionuclides: cobalt-60, cesium-137, plutonium-238, plutonium-239, uranium-234, uranium-235, and uranium-238. The radionuclides are assumed to be in a homogeneously contaminated volume at a concentration that must not be exceeded if the dose criterion is not to be exceeded. The radionuclides evaluated for this site were obtained from the sample analysis results associated with the characterization of this CAS. The highest concentration (maximum sampling result) for each detected radionuclide was used for the hot spot analysis, while the average concentration (mean + 95 percent confidence interval) for each radionuclide was used to perform dose and risk calculations.

Table 1. Input Concentrations for CAS 08-09-03

Dose Calculation		Hot Spot Calculation	
Radionuclide	Average Activity Concentration (pCi/g)	Radionuclide	Maximum Activity Concentration (pCi/g)
Cobalt-60	0.88	Cobalt-60	1.12
Cesium-137	16.6	Cesium-137	37.1
Plutonium-238	0.094	Plutonium-238	0.094
Plutonium-239	0.79	Plutonium-239	1.18
Uranium-234	1.6	Uranium-234	2.14
Uranium-235	0.08	Uranium-235	0.099
Uranium-238	1.58	Uranium-238	2.11

The scenario for this CAS addresses long-term exposure to workers exposed to residual levels of radionuclides in soil during an average workday outdoors onsite and that at some time within 1,000 years the site will be released for use without radiological restrictions following remediation.

The scenario assumes that a worker will be on the site for a total of 335 hours per year for a duration of 25 years. The indoor time is zero. The outdoor time fraction was determined by $335/8760 = 0.038$. The worker exposures are limited to working hours and do not include contributions from ingestion of drinking water, plant foods, meat or fish taken from the immediate area. The exposure pathways considered are summarized in Table 2.

Table 2. Summary of Pathways Considered

Pathway	Dose Calculation	Hot Spot Calculation
External exposure	Yes	Yes
Particulate inhalation	Yes	Yes
Radon inhalation	No	No
Ingestion of soil	Yes	Yes
Ingestion of produce from on-site garden	No	No
Ingestion of meat from on-site livestock	No	No
Ingestion of milk from on-site livestock	No	No
Ingestion of fish from on-site pond	No	No
Ingestion of water from on-site well	No	No

The RESRAD computer code, version 6.22, was used to calculate the dose/source concentration ratios $DSRip(t)$ for all identified radionuclides (i) and pathway (p) at time (t) after remediation. The period considered in this analysis was 1,000 years. Radioactive decay and ingrowth were considered in deriving the dose/source concentration ratios. The various parameters used in the RESRAD code for this analysis are listed in Appendix A. The calculated maximum dose contributions for all considered pathways are presented in Tables 3 and 4 and the dose/source concentration ratios summed over all pathways are presented in Table 5. The maximum dose contributions and total dose/source concentration ratios for CAS 08-09-03 are predicted to occur at time zero. The dose contributions are based on the average (mean plus the 95 percent confidence interval) radionuclide activity concentration and a 16- by 14-meter contamination area. The size of the area chosen for the dose calculation bounds the identified contamination area within this CAS (Figure 1). The data used to calculate the average dose scenario are provided as Exhibit 1.

Uncertainty in the derivation of dose contributions and dose/source concentration ratios comes from the distribution of possible input parameter values, as well as uncertainty in the conceptual model used to represent the site. The external exposure and particulate inhalation pathways contribute greater than 99 percent of the dose. Therefore, uncertainties in the following parameters — occupancy factors, thickness of the contaminated zone, mass loading, and inhalation rate — have the greatest significance on the model predictions.

Figure 1
CAU 357
Mud Pits and Waste Dump
CAS 08-09-03
Mud Pit U-8d

Department of Energy - Nevada Test Site			
CAS 08-09-03 Mud Pit U-8d			
Contoured Radiological Survey Data			
Drawn A. Martinez	Checked S. Alderson	Approved S. Alderson	
Date 4/08/04	Date 12 / 22 / 2004	Date 12 / 22 / 2004	
DP04-090		Plot1.srf	
STOLLER-NAVARRO Radiation Services			

Average Background In Counts Per Second (CPS) 250
 Observed Count Rate Multiples of Background

2 x bkg 500 CPS
 3 x bkg 750 CPS
 4 x bkg 1000 CPS
 5 x bkg 1250 CPS

Coordinates in UTM 11 North
 NAD 1927 (WESTERN), meters

Table 3. Maximum Dose Contributions for CAS 08-09-03 (occurs at t = 0)

Maximum Dose Contributions (mrem/yr)									
Radionuclide	Ground		Inhalation		Soil		Total		
	mrem/yr	Fraction	mrem/yr	Fraction	mrem/yr	Fraction	mrem/yr	Fraction	Fraction
Cobalt-60	4.200E-01	0.1879	4.060E-06	0.0000	3.795E-06	0.0000	4.20E-01	0.0000	0.1879
Cesium-137	1.787E+00	0.7994	1.177E-05	0.0000	1.404E-04	0.0001	1.79E+00	0.0001	0.7995
Plutonium-238	5.083E-07	0.0000	8.252E-04	0.0004	5.126E-05	0.0000	8.77E-04	0.0000	0.0004
Plutonium-239	7.918E-06	0.0000	7.620E-03	0.0034	4.785E-04	0.0002	8.11E-03	0.0002	0.0036
Uranium-234	2.179E-05	0.0000	4.747E-03	0.0021	7.745E-05	0.0000	4.85E-03	0.0000	0.0022
Uranium-235	2.022E-03	0.0009	2.212E-04	0.0001	3.655E-06	0.0000	2.25E-03	0.0000	0.001
Uranium-238	7.728E-03	0.0035	4.191E-03	0.0019	7.270E-05	0.0000	1.20E-02	0.0000	0.0054
Total	2.217E+00	0.9917	1.762E-02	0.0079	8.277E-04	0.0004	2.24E+00	0.0004	1.0000

Table 4. Maximum Dose/Source Concentration Ratios Summed Over All Pathways

Summed Dose/Source Concentration Ratios at Time t = 0.0 Years (mrem/yr)/(pCi/g)	
Radionuclide	(mrem/yr)/(pCi/g)
Cobalt-60	4.77E-01
Cesium-137	1.08E-01
Plutonium-238	9.33E-03
Plutonium-239	1.03E-02
Uranium-234	3.03E-03
Uranium-235	2.81E-02
Uranium-238	7.59E-03

RESRAD default parameters were used where site-specific data was not available. The default values are based on national averages or reasonable maximum values. The contaminated zone thickness of 0.3 meters with no cover was used to derive the dose contribution and is based on the results of the soil sampling. The calculated dose contributions and dose/source concentration ratios are conservative because in reality contamination is rarely distributed uniformly, but rather occurs in localized areas.

The residual radioactive material guideline represents the concentration of residual radioactive material that can remain in place and still allow use of that area without radiological restrictions. The radioactive material guideline, G, can be calculated given a dose limit of H_{EL} for an individual as follows:

$$G = H_{EL} / DSR$$

where DSR is the total dose/source concentration ratio listed in Table 4. The dose limit H_{EL} , used to derive the residual radioactive material guideline, is 25 mrem/yr. The calculated residual radioactive material guidelines for individual radionuclides are presented in Table 5.

Table 5. Residual Radioactive Material Guidelines for CAS 08-09-03

Radionuclide	Guideline (pCi/g)
Cobalt-60	5.238E+01
Cesium-137	2.322E+02
Plutonium-238	2.680E+03
Plutonium-239	2.437E+03
Uranium-234	8.254E+03
Uranium-235	8.903E+02
Uranium-238	3.294E+03

The derived guidelines presented in Table 5 apply to a large, homogeneously contaminated area. For a small, isolated area of contamination (i.e., hot spots), the allowable concentration that can remain on site may be higher than what is allowed by the homogeneous area guideline due to the averaging process. To evaluate the potential for greater exposure to individuals using a site contaminated with hot spots versus a site that is homogeneously contaminated, the following hot spot criterion must be applied. The hot spot soil guideline G_i , can be calculated with RESRAD by using the area of the hot spot or can be conservatively estimated on a single radionuclide bases for field applications by using the following:

$$G_i = G_i(t_m) \times (100 / A)^{1/2}$$

where:

$G_i(t_m)$ = the single radionuclide soil guideline in a homogeneously contaminated zone
 A = area of hot spot (m^2).

The RESRAD code was used to calculate hot spot guideline values for the following hot spot areas: 100 m^2 , 10 m^2 , and 1 m^2 (Exhibits 2, 3, and 4). The initial radionuclide concentrations used were the maximum results and would represent the worst-case radionuclide ratio. The results for these calculations are presented in Table 6.

Table 6. Calculated Hot Spot Guidelines for CAS 08-09-03

Radionuclide	Guidelines (pCi/g), by Size of Hot Spot		
	100 m ²	10 m ²	1 m ²
Cobalt-60	5.649E+01	1.032E+02	4.959E+2
Cesium-137	2.497E+02	4.480E+02	2.117E+03
Plutonium-138	3.013E+03	3.973E+03	5.138E+03
Plutonium-139	2.714E+03	3.615E+03	4.676E+03
Uranium-234	9.104E+03	1.179E+04	1.524E+04
Uranium-235	9.558E+02	1.592E+02	5.543E+03
Uranium-238	3.578E+03	5.625E+03	1.242E+04

The hot spot criteria can be used as long as the average radionuclide concentration for any 100 m² does not exceed the homogeneous residual radioactive material guidelines. A review of the radioanalytical data has identified that cobalt-60 is the most limiting radionuclide in the averaging calculation. Therefore, it is recommended that any hot spots be remediated to the 100-m² cobalt-60 guideline level for as-low-as-reasonably-possible (ALARA) purposes.

The following graphs identify the dose contribution and excess cancer risk for each radionuclide summed across all pathways for this CAS. The EPA generally sets site-specific remediation levels for carcinogens at a level that represents an excess upper-bound lifetime cancer risk to an individual of between 1×10^{-4} to 1×10^{-6} . The “upper boundary of risk range is not a discrete line at 1×10^{-4} , although EPA generally uses 1×10^{-4} in making risk management decisions. A specific risk estimate around 10^{-4} may be considered acceptable if justified based on site-specific conditions.” (EPA, 1991).

Figures 2 and 3 represent the total dose rate per year and total excess cancer risk summed across all pathways for an individual under the scenario for this CAS. At time zero, the total dose rate per year to an individual on site is 2.24 mrem/yr and the total excess cancer risk to the same individual is 4.26×10^{-5} . Therefore, no remediation is warranted under the CAS 08-09-03 scenario because the total dose rate and total excess cancer risk to an individual on site is well within the prescribed EPA guidance. However, the site may contain discrete areas of elevated radiological contamination; as a best management practice of ALARA these discrete areas of elevated radiological contamination should be remediated to the appropriate guideline levels in Table 6.

Figure 2 CAS 08-09-03: Dose Rate Per Year Summed Across All Pathways

DOSE: All Nuclides Summed, All Pathways Summed

CAU357-CAS 080903 Average Parcel.RAD 01/29/2005 10:35 Includes All Pathways

Figure 3 CAS 08-09-03: Excess Cancer Risk Per Year Summed Across All Pathways

EXCESS CANCER RISK: All Nuclides Summed, All Pathways Summed

CAU357-CAS 080903 Average Parcel.RAD 01/29/2005 10:35 Includes All Pathways

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Attachment A for CAS 08-09-03

Scenarios and Parameters Used for Analysis of CAS 08-09-03

The exposure scenario for CAS 08-09-03 addresses long-term exposure to workers exposed to residual levels of radionuclides in soil during an average workday outdoors onsite. This scenario used the following parameters:

Assumes a low occupancy activity at the site.

Workers will be on site 335 hours per year (335 site-hrs/yr) for 25 years.

The indoor time fraction is zero.

The outdoor time fraction is 0.038.

The worker exposures are limited to working hours and do not include contributions from ingestion of drinking water, plant foods, meat, or fish taken from the immediate area.

The parametric values used in the RESRAD code for the analysis of this site are listed in Table A.1. Some parameters are site specific, while other values are the default RESRAD values. The dose conversion factors used for inhalation and ingestion were the default FGR 11 values. The FRG 13 morbidity values were used for the risk slope factor and correspond to the guidance and recommendations per the memorandum from A. Lawrence, Office of Environmental Policy & Guidance, to Distribution, titled *Radiation Risk Estimation from Total Effective Dose Equivalents* (TEDEs) (EH-412-2002-1, August 9, 2002).

Table A.1 RESRAD Parameters Used for 25 mrem/yr Analysis of CAS 08-09-03

Parameter	Units	CAS 08-09-03	Hot Spot	Defaults	Reference/Rationale
R011 Contaminated Zone					
Area of Contaminated Zone	m ²	2.24E+02	100, 10, 1	1.000E+04	Area of contamination and hot spot area
Thickness of Contaminated Zone	m	3.000E-01	3.000E-01	2.000E+00	Based on sampling data
Length Parallel to Aquifer Flow	m	not used	not used	1.000E+02	
Radiation Dose Limit	mrem/yr	25	25	2.5E+001	
Elapsed Time Since Placement of Material	yr	0.0	0.0	0.0	
R012 Initial Principal Radionuclide					
Cobalt-60 (soil)	pCi/g	0.88	1.12	0.0	CAS 08-09-03 soil sampling results
Cesium-137 (soil)	pCi/g	16.6	37.1	0.0	CAS 08-09-03 soil sampling results
Plutonium-238 (soil)	pCi/g	0.094	0.094	0.0	CAS 08-09-03 soil sampling results
Plutonium-239 (soil)	pCi/g	0.79	1.18	0.0	CAS 08-09-03 soil sampling results
Uranium-234 (soil)	pCi/g	1.6	2.14	0.0	CAS 08-09-03 soil sampling results
Uranium-235 (soil)	pCi/g	0.08	0.099	0.0	CAS 08-09-03 soil sampling results
Uranium-238 (soil)	pCi/g	1.58	2.11	0.0	CAS 08-09-03 soil sampling results

Table A.1 RESRAD Parameters Used for 25 mrem/yr Analysis of CAS 08-09-03 Cont.

Parameter	Units	CAS 08-09-03	Hot Spot	Defaults	Reference/Rationale
R013 Cover and Contaminated Zone Hydrological Data					
Cover Depth	m	0.0	0.0	0.0	No Cover Assumed
Density of Cover Material	g/cm ³	not used	not used	1.5	No Cover Assumed
Cover Depth Erosion Rate	m/yr	not used	not used	1.000E-03	No Cover Assumed
Density of Contaminated Zone	g/cm ³	1.5	1.5	1.5	
Contamination Zone Erosion Rate	m/yr	1.000E-03	1.000E-03	1.000E-03	
Contaminated Zone Total Porosity	-	4.000E-01	4.000E-01	4.000E-01	
Contaminated Zone Field Capacity	-	2.000E-01	2.000E-01	2.000E-01	
Contaminated Zone Hydraulic Conductivity	m/yr	1.000E+01	1.000E+01	1.000E+01	
Contaminated Zone b Parameter	-	5.300E+00	5.300E+00	5.300E+00	
Average Annual Wind Speed	m/sec	3.5	3.5	2.000E+00	Data from Air Resource Laboratory
Humidity in Air	g/m ³	not used	not used	8.000E+00	
Evapotranspiration Coefficient	-	5.000E-01	5.000E-01	5.000E-01	
Precipitation	m/yr	3.000E+-2	3.000E+-2	1.000E+00	Data from Air Resources Laboratory
Irrigation	m/yr	0.000E-00	2.000E-01	2.000E-01	
Irrigation Mode	-	overhead	overhead	overhead	
Runoff Coefficient	-	4.000E-01	4.000E-01	2.000E-01	
Watershed Area for Nearby Stream or Pond	m ²	not used	not used	1.000E+06	
Accuracy for Water/Soil Computations	-	not used	not used	1.000E-03	

Table A.1 RESRAD Parameters Used for 25 mrem/yr Analysis of CAS 08-09-03 Cont.

Parameter	Units	CAS 08-09-03	Hot Spot	Defaults	Reference/Rationale
R014 Saturated Zone Hydrological Data					
Density of Saturated Zone	g/cm ³	not used	not used	1.500E+00	
Saturated Zone Total Porosity	-	not used	not used	4.000E-01	
Saturated Zone Effective Porosity	-	not used	not used	2.000E-01	
Saturated Zone Field Capacity	-	not used	not used	2.000E-01	
Saturated Zone Hydraulic Conductivity	m/yr	not used	not used	1.000E+02	
Saturated Zone Hydraulic Gradient	-	not used	not used	2.000E-02	
Saturated Zone b Parameter	-	not used	not used	5.300E+00	
Water Table Drop Rate	m/yr	not used	not used	1.000E-03	
Well Pump Intake Depth	m	not used	not used	1.000E+01	
Model: Nondispersion or Mass-Balance	-	not used	not used	ND	
Well Pumping Rate	m ³ /yr	not used	not used	2.500E+02	
R015 Uncontaminated and Unsaturated Strata Hydrological Data					
Number of Unsaturated Zone Strata	-	not used	not used	1	
Thickness	m	not used	not used	4.000E+00	
Soil Density	g/cm ³	not used	not used	1.500E+00	
Total Porosity	-	not used	not used	4.000E-01	
Effective Porosity	-	not used	not used	2.000E-01	
Field Capacity	-	not used	not used	2.000E-01	
Soil-specific b Parameter	-	not used	not used	5.300E+00	
Hydraulic Conductivity	m/yr	not used	not used	1.000E+01	

Table A.1 RESRAD Parameters Used for 25 mrem/yr Analysis of CAS 08-09-03 Cont.

Parameter	Units	CAS 08-09-03	Hot Spot	Defaults	Reference/Rationale
R016 Distribution Coefficients and Leach Rates					
Contaminated Zone K_d (all Zones)	cm^3/g	1.000E+03	1.000E+03	1.000E+03	Default or a lower value given in RESRAD
Cobalt Radionuclides		1.700E+02	1.700E+02	1.000E+03	
Cesium Radionuclides		2.000E+03	2.000E+03	2.000E+03	
Plutonium Radionuclides		3.500E+01	3.500E+01	5.000E+01	
Uranium Radionuclides					
Saturated Leach Rate	/yr	0.0	0.0	0.0	
Solubility Constant	-	0.0	0.0	0.0	
R017 Inhalation and External Gamma					
Inhalation Rate	m^3/yr	1.230E+04	1.230E+04	8.400E+03	
Mass Loading for Inhalation	g/m^3	6.000E-04	6.000E-04	1E-04	
Exposure Duration	yr	25	25	30	Estimated
Shielding Factor Inhalation	-	1	1	0.4	
Shielding Factor External Gamma	-	1	1	0.7	
Fraction of Time Spent Indoors	-	0.0	0.0	0.5	Estimated
Fraction of Time Spent Outdoors	-	0.038	0.038	0.25	Estimated
Shape Factor	-	1.0	1.0	1.0	
R018 Ingestion Pathway Data, Dietary Parameters					
Fruits, Vegetables, and Grain Consumption	kg/yr	not used	not used	1.600E+02	
Leafy Vegetable Consumption	kg/yr	not used	not used	1.400E+01	
Milk Consumption	L/yr	not used	not used	9.200E+01	
Meat and Poultry Consumption	kg/yr	not used	not used	6.300E+01	

Table A.1 RESRAD Parameters Used for 25 mrem/yr Analysis of CAS 08-09-03 Cont.

Parameter	Units	CAS 08-09-03	Hot Spot	Defaults	Reference/Rationale
Fish Consumption	kg/yr	not used	not used	5.400E+00	
Other Seafood Consumption	kg/yr	not used	not used	9.000E-01	
Soil Ingestion Rate	g/yr	20.1	20.1	36.5	EPA 1991, 480 mg/day
Drinking Water Intake	L/yr	not used	not used	5.100E+02	
Drinking Water Contaminated Fraction	-	not used	not used	1.000E+00	
Household Water Contaminated Fraction	-	not used	not used	1.000E+00	
Livestock Water Contaminated Fraction	-	not used	not used	1.000E+00	
Irrigation Water Contaminated Fraction	-	not used	not used	1.000E+00	
Aquatic Food Contamination Fraction	-	not used	not used	5.000E-01	
Plant Food Contamination Fraction	-	not used	not used	-1	
Meat Contamination Fraction	-	not used	not used	-1	
Milk Contamination Fraction	-	not used	not used	-1	
R019 Ingestion Pathway Data, Nondietary					
Livestock Fodder Intake for Meat	kg/day	not used	not used	6.800E+01	
Livestock Fodder Intake for Milk	kg/day	not used	not used	5.500E+01	
Livestock Water Intake for Meat	L/day	not used	not used	5.000E+01	
Livestock Water Intake for Milk	L/day	not used	not used	1.600E+02	
Livestock Soil Intake	kg/day	not used	not used	5.000E-01	
Mass Loading for Foliar Deposition	g/m ³	not used	not used	1.000E-04	
Depth of Soil Mixing layer	m	1.500E-01	1.500E-01	1.500E-01	
Depth of Roots	m	not used	not used	9.000E-01	

Table A.1 RESRAD Parameters Used for 25 mrem/yr Analysis of CAS 08-09-03 Cont.

Parameter	Units	CAS 08-09-03	Hot Spot	Defaults	Reference/Rationale
Drinking Water Fraction from Groundwater	-	not used	not used	1.000E+00	
Household Water Fraction from Groundwater	-	not used	not used	1.000E+00	
Livestock Water Fraction from Groundwater	-	not used	not used	1.000E+00	
Irrigation Fraction from Groundwater	-	not used	not used	1.000E+00	
R021 Radon					
Radon Parameters Not Used					

Exhibit 1

RESRAD Scenario CAS 08-09-03 Average Dose

(24 Pages)

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines	
=====	
Dose Conversion Factor (and Related) Parameter Summary ...	2
Site-Specific Parameter Summary	5
Summary of Pathway Selections	11
Contaminated Zone and Total Dose Summary	12
Total Dose Components	
Time = 0.000E+00	13
Time = 1.000E+00	14
Time = 3.000E+00	15
Time = 1.000E+01	16
Time = 3.000E+01	17
Time = 1.000E+02	18
Time = 3.000E+02	19
Time = 1.000E+03	20
Dose/Source Ratios Summed Over All Pathways	21
Single Radionuclide Soil Guidelines	22
Dose Per Nuclide Summed Over All Pathways	23
Soil Concentration Per Nuclide	24

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

0	Menu	Parameter	Current Value	Default	Parameter Name
		Dose conversion factors for inhalation, mrem/pCi:			
B-1	AC-227+D		6.720E+00	6.720E+00	DCF2 (1)
B-1	Co-60		2.190E-04	2.190E-04	DCF2 (2)
B-1	CS-137+D		3.190E-05	3.190E-05	DCF2 (3)
B-1	Pa-231		1.280E+00	1.280E+00	DCF2 (4)
B-1	Pb-210+D		1.380E-02	1.380E-02	DCF2 (5)
B-1	Po-210		9.400E-03	9.400E-03	DCF2 (6)
B-1	Pu-238		3.920E-01	3.920E-01	DCF2 (7)
B-1	Pu-239		4.290E-01	4.290E-01	DCF2 (8)
B-1	Ra-226+D		8.600E-03	8.600E-03	DCF2 (9)
B-1	Th-230		3.260E-01	3.260E-01	DCF2 (10)
B-1	U-234		1.320E-01	1.320E-01	DCF2 (11)
B-1	U-235+D		1.230E-01	1.230E-01	DCF2 (12)
B-1	U-238+D		1.180E-01	1.180E-01	DCF2 (13)
		Dose conversion factors for ingestion, mrem/pCi:			
D-1	AC-227+D		1.480E-02	1.480E-02	DCF3 (1)
D-1	Co-60		2.690E-05	2.690E-05	DCF3 (2)
D-1	CS-137+D		5.000E-05	5.000E-05	DCF3 (3)
D-1	Pa-231		1.060E-02	1.060E-02	DCF3 (4)
D-1	Pb-210+D		5.370E-03	5.370E-03	DCF3 (5)
D-1	Po-210		1.900E-03	1.900E-03	DCF3 (6)
D-1	Pu-238		3.200E-03	3.200E-03	DCF3 (7)
D-1	Pu-239		3.540E-03	3.540E-03	DCF3 (8)
D-1	Ra-226+D		1.330E-03	1.330E-03	DCF3 (9)
D-1	Th-230		5.480E-04	5.480E-04	DCF3 (10)
D-1	U-234		2.830E-04	2.830E-04	DCF3 (11)
D-1	U-235+D		2.670E-04	2.670E-04	DCF3 (12)
D-1	U-238+D		2.690E-04	2.690E-04	DCF3 (13)
		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	Co-60 , plant/soil concentration ratio, dimensionless		8.000E-02	8.000E-02	RTF (2,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		2.000E-02	2.000E-02	RTF (2,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)		2.000E-03	2.000E-03	RTF (2,3)
D-34	CS-137+D , plant/soil concentration ratio, dimensionless		4.000E-02	4.000E-02	RTF (3,1)
D-34	CS-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		3.000E-02	3.000E-02	RTF (3,2)
D-34	CS-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)		8.000E-03	8.000E-03	RTF (3,3)
D-34	Pa-231 , plant/soil concentration ratio, dimensionless		1.000E-02	1.000E-02	RTF (4,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		5.000E-03	5.000E-03	RTF (4,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)		5.000E-06	5.000E-06	RTF (4,3)
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless		1.000E-02	1.000E-02	RTF (5,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		8.000E-04	8.000E-04	RTF (5,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)		3.000E-04	3.000E-04	RTF (5,3)

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

Menu	Parameter	Current Value	Default	Parameter Name
0				
D-34	Po-210 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (6,1)
D-34	Po-210 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF (6,2)
D-34	Po-210 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.400E-04	3.400E-04	RTF (6,3)
D-34				
D-34	Pu-238 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (7,1)
D-34	Pu-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF (7,2)
D-34	Pu-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF (7,3)
D-34				
D-34	Pu-239 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (8,1)
D-34	Pu-239 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF (8,2)
D-34	Pu-239 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF (8,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF (9,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF (9,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF (9,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (10,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF (10,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF (10,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF (11,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF (11,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF (11,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF (12,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF (12,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF (12,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF (13,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF (13,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF (13,3)
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	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC (2,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC (2,2)
D-5				
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC (3,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC (3,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC (4,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC (4,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC (5,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC (5,2)
D-5				
D-5	Po-210 , fish	1.000E+02	1.000E+02	BIOFAC (6,1)
D-5	Po-210 , crustacea and mollusks	2.000E+04	2.000E+04	BIOFAC (6,2)

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

Menu	Parameter	Current Value	Default	Parameter Name
D-5	Pu-238 , fish	3.000E+01	3.000E+01	BIOFAC(7,1)
D-5	Pu-238 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(7,2)
D-5	Pu-239 , fish	3.000E+01	3.000E+01	BIOFAC(8,1)
D-5	Pu-239 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(8,2)
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(9,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(9,2)
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(10,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(10,2)
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(11,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(11,2)
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(12,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(12,2)
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(13,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(13,2)

Site-Specific Parameter Summary

0	Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011		Area of contaminated zone (m**2)	2.240E+02	1.000E+04	---	AREA
R011		Thickness of contaminated zone (m)	3.000E-01	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	2.500E+01	---	BRDL
R011		Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011		Times for calculations (yr)	1.000E+00	1.000E+00	---	T (2)
R011		Times for calculations (yr)	3.000E+00	3.000E+00	---	T (3)
R011		Times for calculations (yr)	1.000E+01	1.000E+01	---	T (4)
R011		Times for calculations (yr)	3.000E+01	3.000E+01	---	T (5)
R011		Times for calculations (yr)	1.000E+02	1.000E+02	---	T (6)
R011		Times for calculations (yr)	3.000E+02	3.000E+02	---	T (7)
R011		Times for calculations (yr)	1.000E+03	1.000E+03	---	T (8)
R011		Times for calculations (yr)	not used	0.000E+00	---	T (9)
R011		Times for calculations (yr)	not used	0.000E+00	---	T (10)
R012		Initial principal radionuclide (pCi/g): Co-60	8.800E-01	0.000E+00	---	SI (2)
R012		Initial principal radionuclide (pCi/g): Cs-137	1.660E+01	0.000E+00	---	SI (3)
R012		Initial principal radionuclide (pCi/g): Pu-238	9.400E-02	0.000E+00	---	SI (7)
R012		Initial principal radionuclide (pCi/g): Pu-239	7.900E-01	0.000E+00	---	SI (8)
R012		Initial principal radionuclide (pCi/g): U-234	1.600E+00	0.000E+00	---	SI (11)
R012		Initial principal radionuclide (pCi/g): U-235	8.000E-02	0.000E+00	---	SI (12)
R012		Initial principal radionuclide (pCi/g): U-238	1.580E+00	0.000E+00	---	SI (13)
R012		Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	WI (2)
R012		Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	WI (3)
R012		Concentration in groundwater (pCi/L): Pu-238	not used	0.000E+00	---	WI (7)
R012		Concentration in groundwater (pCi/L): Pu-239	not used	0.000E+00	---	WI (8)
R012		Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	WI (11)
R012		Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	WI (12)
R012		Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	WI (13)
R013		Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013		Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013		Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013		Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSCZ
R013		Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013		Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013		Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013		Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCCZ
R013		Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
R013		Average annual wind speed (m/sec)	3.500E+00	2.000E+00	---	WIND
R013		Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013		Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013		Precipitation (m/yr)	3.000E-02	1.000E+00	---	PRECIP
R013		Irrigation (m/yr)	0.000E+00	2.000E-01	---	RI
R013		Irrigation mode	overhead	overhead	---	IDITCH
R013		Runoff coefficient	4.000E-01	2.000E-01	---	RUNOFF
R013		Watershed area for nearby stream or pond (m**2)	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

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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
R015		Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015		Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015		Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015		Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015		Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015		Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015		Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016		Distribution coefficients for Co-60				
R016		Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(2)
R016		Unsat. zone 1 (cm**3/g)	not used	1.000E+03	---	DCNUCU(2,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+03	---	DCNUCS(2)
R016		Leach rate (/yr)	0.000E+00	0.000E+00	2.000E-05	ALEACH(2)
R016		Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016		Distribution coefficients for Cs-137				
R016		Contaminated zone (cm**3/g)	1.700E+02	1.000E+03	---	DCNUCC(3)
R016		Unsat. zone 1 (cm**3/g)	not used	1.000E+03	---	DCNUCU(3,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+03	---	DCNUCS(3)
R016		Leach rate (/yr)	0.000E+00	0.000E+00	1.175E-04	ALEACH(3)
R016		Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016		Distribution coefficients for Pu-238				
R016		Contaminated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCC(7)
R016		Unsat. zone 1 (cm**3/g)	not used	2.000E+03	---	DCNUCU(7,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+03	---	DCNUCS(7)
R016		Leach rate (/yr)	0.000E+00	0.000E+00	9.999E-06	ALEACH(7)
R016		Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016		Distribution coefficients for Pu-239				
R016		Contaminated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCC(8)
R016		Unsat. zone 1 (cm**3/g)	not used	2.000E+03	---	DCNUCU(8,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+03	---	DCNUCS(8)
R016		Leach rate (/yr)	0.000E+00	0.000E+00	9.999E-06	ALEACH(8)
R016		Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)

Summary : CAU 357 CAS 080903 Average Parcel

File : CAU357-CAS 080903 Average Parcel Final.RAD

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
		Distribution coefficients for U-234				
R016		Contaminated zone (cm**3/g)	3.500E+01	5.000E+01	---	DCNUCC(11)
R016		Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(11,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(11)
R016		Leach rate (/yr)	0.000E+00	0.000E+00	5.688E-04	ALEACH(11)
R016		Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(11)
		Distribution coefficients for U-235				
R016		Contaminated zone (cm**3/g)	3.500E+01	5.000E+01	---	DCNUCC(12)
R016		Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(12,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(12)
R016		Leach rate (/yr)	0.000E+00	0.000E+00	5.688E-04	ALEACH(12)
R016		Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(12)
		Distribution coefficients for U-238				
R016		Contaminated zone (cm**3/g)	3.500E+01	5.000E+01	---	DCNUCC(13)
R016		Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(13,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(13)
R016		Leach rate (/yr)	0.000E+00	0.000E+00	5.688E-04	ALEACH(13)
R016		Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(13)
		Distribution coefficients for daughter Ac-227				
R016		Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016		Unsaturated zone 1 (cm**3/g)	not used	2.000E+01	---	DCNUCU(1,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+01	---	DCNUCS(1)
R016		Leach rate (/yr)	0.000E+00	0.000E+00	9.921E-04	ALEACH(1)
R016		Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
		Distribution coefficients for daughter Pa-231				
R016		Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(4)
R016		Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(4,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(4)
R016		Leach rate (/yr)	0.000E+00	0.000E+00	3.987E-04	ALEACH(4)
R016		Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
		Distribution coefficients for daughter Pb-210				
R016		Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(5)
R016		Unsaturated zone 1 (cm**3/g)	not used	1.000E+02	---	DCNUCU(5,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+02	---	DCNUCS(5)
R016		Leach rate (/yr)	0.000E+00	0.000E+00	1.997E-04	ALEACH(5)
R016		Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
		Distribution coefficients for daughter Po-210				
R016		Contaminated zone (cm**3/g)	1.000E+01	1.000E+01	---	DCNUCC(6)
R016		Unsaturated zone 1 (cm**3/g)	not used	1.000E+01	---	DCNUCU(6,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+01	---	DCNUCS(6)
R016		Leach rate (/yr)	0.000E+00	0.000E+00	1.969E-03	ALEACH(6)
R016		Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
0					
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC (9)
R016	Unsaturated zone 1 (cm**3/g)	not used	7.000E+01	---	DCNUCU (9,1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS (9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.851E-04	ALEACH (9)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK (9)
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC (10)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU (10,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS (10)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.333E-07	ALEACH (10)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK (10)
R017	Inhalation rate (m**3/yr)	1.230E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	6.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	2.500E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	1.000E+00	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	1.000E+00	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	3.800E-02	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)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
0					
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)	2.010E+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	---	LF15
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LF16
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LW15
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LW16
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	---	C14SOIL

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
0					
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	---	BVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
C14	DCF correction factor for gaseous forms of C14	not used	8.894E+01	---	CO2F
STOR	Storage times of contaminated foodstuffs (days) :				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec) :				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	1	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	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	active

Contaminated Zone Dimensions   Initial Soil Concentrations, pCi/g

Area:	224.00 square meters	Co-60	8.800E-01
Thickness:	0.30 meters	Cs-137	1.660E+01
Cover Depth:	0.00 meters	Pu-238	9.400E-02
		Pu-239	7.900E-01
		U-234	1.600E+00
		U-235	8.000E-02
		U-238	1.580E+00

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

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	2.235E+00	2.142E+00	1.977E+00	1.555E+00	9.218E-01	1.956E-01	0.000E+00	0.000E+00
M(t):	8.941E-02	8.568E-02	7.908E-02	6.221E-02	3.687E-02	7.823E-03	0.000E+00	0.000E+00

Maximum TDOSE(t): 2.235E+00 mrem/yr   at t = 0.000E+00 years

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

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

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground			Inhalation			Radon			Plant			Meat			Milk			Soil		
	mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.	
Co-60	4.200E-01	0.1879		4.060E-06	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		3.795E-06	0.0000	
Cs-137	1.787E+00	0.7994		1.177E-05	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		1.404E-04	0.0001	
Pu-238	5.083E-07	0.0000		8.252E-04	0.0004		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		5.126E-05	0.0000	
Pu-239	7.918E-06	0.0000		7.620E-03	0.0034		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		4.785E-04	0.0002	
U-234	2.179E-05	0.0000		4.747E-03	0.0021		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		7.745E-05	0.0000	
U-235	2.022E-03	0.0009		2.212E-04	0.0001		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		3.655E-06	0.0000	
U-238	7.728E-03	0.0035		4.191E-03	0.0019		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		7.270E-05	0.0000	
=====	=====	=====		=====	=====		=====	=====		=====	=====		=====	=====		=====	=====		=====	=====	
Total	2.217E+00	0.9917		1.762E-02	0.0079		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		8.277E-04	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 = 0.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water			Fish			Radon			Plant			Meat			Milk			All Pathways*		
	mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.	
Co-60	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		4.200E-01	0.1879	
Cs-137	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		1.787E+00	0.7995	
Pu-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		8.769E-04	0.0004	
Pu-239	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		8.106E-03	0.0036	
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		4.846E-03	0.0022	
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		2.247E-03	0.0010	
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		1.199E-02	0.0054	
=====	=====	=====		=====	=====		=====	=====		=====	=====		=====	=====		=====	=====		=====	=====	
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		2.235E+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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	3.682E-01	0.1719	3.560E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.327E-06	0.0000
Cs-137	1.746E+00	0.8150	1.150E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.371E-04	0.0001
Pu-238	5.043E-07	0.0000	8.187E-04	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.086E-05	0.0000
Pu-239	7.917E-06	0.0000	7.619E-03	0.0036	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.784E-04	0.0002
U-234	2.179E-05	0.0000	4.744E-03	0.0022	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.741E-05	0.0000
U-235	2.021E-03	0.0009	2.211E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.656E-06	0.0000
U-238	7.723E-03	0.0036	4.188E-03	0.0020	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.266E-05	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	2.124E+00	0.9914	1.761E-02	0.0082	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.235E-04	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+00 years
Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.682E-01	0.1719
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.746E+00	0.8150
Pu-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	8.700E-04	0.0004
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.106E-03	0.0038
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	4.844E-03	0.0023
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	2.245E-03	0.0010
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	1.198E-02	0.0056
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	2.142E+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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	2.829E-01	0.1431	2.736E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.558E-06	0.0000
Cs-137	1.666E+00	0.8427	1.098E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.309E-04	0.0001
Pu-238	4.964E-07	0.0000	8.058E-04	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.006E-05	0.0000
Pu-239	7.916E-06	0.0000	7.619E-03	0.0039	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.784E-04	0.0002
U-234	2.177E-05	0.0000	4.739E-03	0.0024	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.732E-05	0.0000
U-235	2.018E-03	0.0010	2.210E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.659E-06	0.0000
U-238	7.712E-03	0.0039	4.183E-03	0.0021	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.257E-05	0.0000
===== Total	1.959E+00	0.9907	1.758E-02	0.0089	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.155E-04	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 = 3.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.829E-01	0.1431
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.666E+00	0.8428
Pu-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	8.564E-04	0.0004
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.105E-03	0.0041
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	4.838E-03	0.0024
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	2.243E-03	0.0011
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	1.197E-02	0.0061
===== 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	1.977E+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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	1.124E-01	0.0723	1.090E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.019E-06	0.0000
Cs-137	1.415E+00	0.9097	9.330E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.113E-04	0.0001
Pu-238	4.697E-07	0.0000	7.624E-04	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.736E-05	0.0000
Pu-239	7.914E-06	0.0000	7.617E-03	0.0049	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.783E-04	0.0003
U-234	2.180E-05	0.0000	4.721E-03	0.0030	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.702E-05	0.0000
U-235	2.010E-03	0.0013	2.208E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.672E-06	0.0000
U-238	7.673E-03	0.0049	4.167E-03	0.0027	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.229E-05	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	1.537E+00	0.9882	1.750E-02	0.0113	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.909E-04	0.0005

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.124E-01	0.0723
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.415E+00	0.9098
Pu-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	8.103E-04	0.0005
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.103E-03	0.0052
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	4.820E-03	0.0031
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	2.235E-03	0.0014
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	1.191E-02	0.0077
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	1.555E+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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	8.041E-03	0.0087	7.851E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.339E-08	0.0000
Cs-137	8.862E-01	0.9613	5.863E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.994E-05	0.0001
Pu-238	4.010E-07	0.0000	6.509E-04	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.043E-05	0.0000
Pu-239	7.903E-06	0.0000	7.611E-03	0.0083	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.779E-04	0.0005
U-234	2.245E-05	0.0000	4.669E-03	0.0051	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.617E-05	0.0001
U-235	1.988E-03	0.0022	2.216E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.730E-06	0.0000
U-238	7.557E-03	0.0082	4.120E-03	0.0045	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.147E-05	0.0001
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	9.038E-01	0.9805	1.728E-02	0.0187	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.397E-04	0.0008

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.041E-03	0.0087
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.863E-01	0.9614
Pu-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	6.917E-04	0.0008
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.096E-03	0.0088
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	4.768E-03	0.0052
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	2.213E-03	0.0024
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	1.175E-02	0.0127
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	9.218E-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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	7.686E-07	0.0000	7.881E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.367E-12	0.0000
Cs-137	1.693E-01	0.8656	1.154E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.376E-05	0.0001
Pu-238	2.306E-07	0.0000	3.742E-04	0.0019	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.324E-05	0.0001
Pu-239	7.814E-06	0.0000	7.590E-03	0.0388	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.766E-04	0.0024
U-234	3.079E-05	0.0002	4.494E-03	0.0230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.330E-05	0.0004
U-235	1.899E-03	0.0097	2.306E-04	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.029E-06	0.0000
U-238	7.042E-03	0.0360	3.960E-03	0.0202	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.870E-05	0.0004
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	1.783E-01	0.9115	1.665E-02	0.0851	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.596E-04	0.0034

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years
 Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.686E-07	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.693E-01	0.8656
Pu-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	3.977E-04	0.0020
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.074E-03	0.0413
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	4.598E-03	0.0235
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	2.134E-03	0.0109
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	1.107E-02	0.0566
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	1.956E-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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

*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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

*Sum of all water independent and dependent pathways.

		Dose/Source Ratios Summed Over All Pathways									
		Parent and Progeny Principal Radionuclide Contributions Indicated									
oParent		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	1.000E+02	3.000E+02	1.000E+03
Co-60	Co-60	1.000E+00		4.773E-01	4.184E-01	3.214E-01	1.278E-01	9.138E-03	8.734E-07	0.000E+00	0.000E+00
0Cs-137	Cs-137	1.000E+00		1.077E-01	1.052E-01	1.004E-01	8.524E-02	5.339E-02	1.020E-02	0.000E+00	0.000E+00
0Pu-238	Pu-238	1.000E+00		9.329E-03	9.256E-03	9.110E-03	8.620E-03	7.358E-03	4.230E-03	0.000E+00	0.000E+00
Pu-238	U-234	1.000E+00		4.283E-09	1.280E-08	2.962E-08	8.628E-08	2.307E-07	5.765E-07	0.000E+00	0.000E+00
Pu-238	Th-230	1.000E+00		3.168E-14	2.212E-13	1.163E-12	1.020E-11	8.140E-11	7.353E-10	0.000E+00	0.000E+00
Pu-238	Ra-226	1.000E+00		1.636E-16	2.449E-15	2.844E-14	7.409E-13	1.722E-11	5.064E-10	0.000E+00	0.000E+00
Pu-238	Pb-210	1.000E+00		4.071E-21	1.253E-19	3.109E-18	2.300E-16	1.400E-14	1.027E-12	0.000E+00	0.000E+00
Pu-238	Po-210	1.000E+00		3.682E-22	1.881E-20	6.987E-19	7.124E-17	4.922E-15	3.789E-13	0.000E+00	0.000E+00
Pu-238	\$DSR(j)	1.000E+00		9.329E-03	9.256E-03	9.110E-03	8.620E-03	7.359E-03	4.230E-03	0.000E+00	0.000E+00
0Pu-239	Pu-239	1.000E+00		1.026E-02	1.026E-02	1.026E-02	1.026E-02	1.025E-02	1.022E-02	0.000E+00	0.000E+00
Pu-239	U-235	1.000E+00		1.383E-11	4.148E-11	9.672E-11	2.895E-10	8.355E-10	2.673E-09	0.000E+00	0.000E+00
Pu-239	Pa-231	1.000E+00		1.282E-16	8.971E-16	4.738E-15	4.229E-14	3.540E-13	3.741E-12	0.000E+00	0.000E+00
Pu-239	Ac-227	1.000E+00		6.034E-18	8.986E-17	1.032E-15	2.584E-14	5.418E-13	1.237E-11	0.000E+00	0.000E+00
Pu-239	\$DSR(j)	1.000E+00		1.026E-02	1.026E-02	1.026E-02	1.026E-02	1.025E-02	1.022E-02	0.000E+00	0.000E+00
0U-234	U-234	1.000E+00		3.029E-03	3.027E-03	3.024E-03	3.012E-03	2.977E-03	2.861E-03	0.000E+00	0.000E+00
U-234	Th-230	1.000E+00		3.359E-08	1.007E-07	2.349E-07	7.033E-07	2.031E-06	6.559E-06	0.000E+00	0.000E+00
U-234	Ra-226	1.000E+00		2.312E-10	1.618E-09	8.540E-09	7.604E-08	6.316E-07	6.369E-06	0.000E+00	0.000E+00
U-234	Pb-210	1.000E+00		7.180E-15	1.070E-13	1.239E-12	3.084E-11	6.500E-10	1.504E-08	0.000E+00	0.000E+00
U-234	Po-210	1.000E+00		7.511E-16	1.831E-14	3.050E-13	9.996E-12	2.324E-10	5.578E-09	0.000E+00	0.000E+00
U-234	\$DSR(j)	1.000E+00		3.029E-03	3.027E-03	3.024E-03	3.012E-03	2.980E-03	2.874E-03	0.000E+00	0.000E+00
0U-235	U-235	1.000E+00		2.808E-02	2.806E-02	2.803E-02	2.792E-02	2.759E-02	2.629E-02	0.000E+00	0.000E+00
U-235	Pa-231	1.000E+00		3.905E-07	1.171E-06	2.729E-06	8.159E-06	2.346E-05	7.445E-05	0.000E+00	0.000E+00
U-235	Ac-227	1.000E+00		2.447E-08	1.696E-07	8.774E-07	7.276E-06	5.008E-05	3.067E-04	0.000E+00	0.000E+00
U-235	\$DSR(j)	1.000E+00		2.808E-02	2.807E-02	2.804E-02	2.793E-02	2.766E-02	2.668E-02	0.000E+00	0.000E+00
0U-238	U-238	1.000E+00		7.589E-03	7.585E-03	7.575E-03	7.539E-03	7.436E-03	7.006E-03	0.000E+00	0.000E+00
U-238	U-234	1.000E+00		4.293E-09	1.287E-08	3.000E-08	8.965E-08	2.575E-07	8.151E-07	0.000E+00	0.000E+00
U-238	Th-230	1.000E+00		3.174E-14	2.221E-13	1.173E-12	1.047E-11	8.758E-11	9.257E-10	0.000E+00	0.000E+00
U-238	Ra-226	1.000E+00		1.639E-16	2.457E-15	2.862E-14	7.553E-13	1.819E-11	6.028E-10	0.000E+00	0.000E+00
U-238	Pb-210	1.000E+00		4.075E-21	1.256E-19	3.125E-18	2.336E-16	1.465E-14	1.195E-12	0.000E+00	0.000E+00
U-238	Po-210	1.000E+00		3.686E-22	1.885E-20	7.021E-19	7.231E-17	5.146E-15	4.405E-13	0.000E+00	0.000E+00
U-238	\$DSR(j)	1.000E+00		7.589E-03	7.585E-03	7.575E-03	7.539E-03	7.436E-03	7.007E-03	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).
\$ is used to indicate summation; the Greek sigma is not included in this font.
The DSR includes contributions from associated (half-life <= 30 days) daughters.
*****

Single Radionuclide Soil Guidelines G(i,t) in pCi/g									
Basic Radiation Dose Limit = 2.500E+01 mrem/yr									
ONuclide	t = 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
Co-60	5.238E+01	5.975E+01	7.778E+01	1.957E+02	2.736E+03	2.862E+07	*1.131E+15	*1.131E+15	
Cs-137	2.322E+02	2.377E+02	2.491E+02	2.933E+02	4.683E+02	2.451E+03	*8.701E+13	*8.701E+13	
Pu-238	2.680E+03	2.701E+03	2.744E+03	2.900E+03	3.397E+03	5.910E+03	*1.711E+13	*1.711E+13	
Pu-239	2.437E+03	2.437E+03	2.437E+03	2.437E+03	2.439E+03	2.445E+03	*6.212E+10	*6.212E+10	
U-234	8.254E+03	8.258E+03	8.267E+03	8.299E+03	8.389E+03	8.700E+03	*6.245E+09	*6.245E+09	
U-235	8.903E+02	8.908E+02	8.917E+02	8.949E+02	9.037E+02	9.372E+02	*2.160E+06	*2.160E+06	
U-238	3.294E+03	3.296E+03	3.301E+03	3.316E+03	3.362E+03	3.568E+03	*3.360E+05	*3.360E+05	
*****	*****	*****	*****	*****	*****	*****	*****	*****	
*At specific activity limit									

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)									
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g									
at tmin = time of minimum single radionuclide soil guideline									
and at tmax = time of maximum total dose = 0.000E+00 years									
ONuclide	Initial	tmin	DSR(i,tmin)	G(i,tmin)	DSR(i,tmax)	G(i,tmax)			
(i)	(pCi/g)	(years)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)			
Co-60	8.800E-01	0.000E+00	4.773E-01	5.238E+01	4.773E-01	5.238E+01			
Cs-137	1.660E+01	0.000E+00	1.077E-01	2.322E+02	1.077E-01	2.322E+02			
Pu-238	9.400E-02	0.000E+00	9.329E-03	2.680E+03	9.329E-03	2.680E+03			
Pu-239	7.900E-01	0.000E+00	1.026E-02	2.437E+03	1.026E-02	2.437E+03			
U-234	1.600E+00	0.000E+00	3.029E-03	8.254E+03	3.029E-03	8.254E+03			
U-235	8.000E-02	0.000E+00	2.808E-02	8.903E+02	2.808E-02	8.903E+02			
U-238	1.580E+00	0.000E+00	7.589E-03	3.294E+03	7.589E-03	3.294E+03			
*****	*****	*****	*****	*****	*****	*****			

Individual Nuclide Dose Summed Over All Pathways									
Parent Nuclide and Branch Fraction Indicated			DOSE(j,t), mrem/yr						
ONuclide	Parent	BRF(i)	t=						
(j)	(i)		0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02
Co-60	Co-60	1.000E+00	4.200E-01	3.682E-01	2.829E-01	1.124E-01	8.041E-03	7.686E-07	0.000E+00
OCs-137	Cs-137	1.000E+00	1.787E+00	1.746E+00	1.666E+00	1.415E+00	8.863E-01	1.693E-01	0.000E+00
OPu-238	Pu-238	1.000E+00	8.769E-04	8.700E-04	8.564E-04	8.103E-04	6.917E-04	3.976E-04	0.000E+00
OU-234	Pu-238	1.000E+00	4.026E-10	1.203E-09	2.784E-09	8.110E-09	2.168E-08	5.419E-08	0.000E+00
U-234	U-234	1.000E+00	4.846E-03	4.843E-03	4.838E-03	4.819E-03	4.764E-03	4.577E-03	0.000E+00
U-234	U-238	1.000E+00	6.783E-09	2.034E-08	4.740E-08	1.416E-07	4.068E-07	1.288E-06	0.000E+00
U-234	DOSE(j)		4.846E-03	4.844E-03	4.838E-03	4.819E-03	4.764E-03	4.578E-03	0.000E+00
OTH-230	Pu-238	1.000E+00	2.978E-15	2.079E-14	1.093E-13	9.590E-13	7.651E-12	6.912E-11	0.000E+00
Th-230	U-234	1.000E+00	5.374E-08	1.612E-07	3.759E-07	1.125E-06	3.250E-06	1.049E-05	0.000E+00
Th-230	U-238	1.000E+00	5.014E-14	3.509E-13	1.853E-12	1.654E-11	1.384E-10	1.463E-09	0.000E+00
Th-230	DOSE(j)		5.374E-08	1.612E-07	3.759E-07	1.125E-06	3.250E-06	1.050E-05	0.000E+00
ORa-226	Pu-238	1.000E+00	1.538E-17	2.302E-16	2.673E-15	6.965E-14	1.618E-12	4.760E-11	0.000E+00
Ra-226	U-234	1.000E+00	3.700E-10	2.589E-09	1.366E-08	1.217E-07	1.011E-06	1.019E-05	0.000E+00
Ra-226	U-238	1.000E+00	2.589E-16	3.882E-15	4.523E-14	1.193E-12	2.874E-11	9.524E-10	0.000E+00
Ra-226	DOSE(j)		3.700E-10	2.589E-09	1.366E-08	1.217E-07	1.011E-06	1.019E-05	0.000E+00
OPb-210	Pu-238	1.000E+00	3.826E-22	1.178E-20	2.922E-19	2.162E-17	1.316E-15	9.653E-14	0.000E+00
Pb-210	U-234	1.000E+00	1.149E-14	1.711E-13	1.966E-12	4.935E-11	1.040E-09	2.407E-08	0.000E+00
Pb-210	U-238	1.000E+00	6.439E-21	1.985E-19	4.938E-18	3.691E-16	2.315E-14	1.887E-12	0.000E+00
Pb-210	DOSE(j)		1.149E-14	1.711E-13	1.966E-12	4.935E-11	1.040E-09	2.407E-08	0.000E+00
OPo-210	Pu-238	1.000E+00	3.461E-23	1.768E-21	6.568E-20	6.696E-18	4.626E-16	3.562E-14	0.000E+00
Po-210	U-234	1.000E+00	1.202E-15	2.930E-14	4.880E-13	1.599E-11	3.718E-10	8.925E-09	0.000E+00
Po-210	U-238	1.000E+00	5.824E-22	2.979E-20	1.109E-18	1.142E-16	8.131E-15	6.959E-13	0.000E+00
Po-210	DOSE(j)		1.202E-15	2.930E-14	4.880E-13	1.599E-11	3.718E-10	8.926E-09	0.000E+00
OPu-239	Pu-239	1.000E+00	8.106E-03	8.106E-03	8.105E-03	8.103E-03	8.096E-03	8.074E-03	0.000E+00
OU-235	Pu-239	1.000E+00	1.092E-11	3.277E-11	7.641E-11	2.287E-10	6.600E-10	2.112E-09	0.000E+00
U-235	U-235	1.000E+00	2.246E-03	2.245E-03	2.243E-03	2.234E-03	2.207E-03	2.104E-03	0.000E+00
U-235	DOSE(j)		2.246E-03	2.245E-03	2.243E-03	2.234E-03	2.207E-03	2.104E-03	0.000E+00
OPa-231	Pu-239	1.000E+00	1.013E-16	7.087E-16	3.743E-15	3.341E-14	2.797E-13	2.956E-12	0.000E+00
Pa-231	U-235	1.000E+00	3.124E-08	9.367E-08	2.183E-07	6.527E-07	1.877E-06	5.956E-06	0.000E+00
Pa-231	DOSE(j)		3.124E-08	9.367E-08	2.183E-07	6.527E-07	1.877E-06	5.956E-06	0.000E+00
OAc-227	Pu-239	1.000E+00	4.767E-18	7.099E-17	8.150E-16	2.042E-14	4.280E-13	9.773E-12	0.000E+00
Ac-227	U-235	1.000E+00	1.957E-09	1.357E-08	7.019E-08	5.821E-07	4.006E-06	2.454E-05	0.000E+00
Ac-227	DOSE(j)		1.957E-09	1.357E-08	7.019E-08	5.821E-07	4.006E-06	2.454E-05	0.000E+00
OU-238	U-238	1.000E+00	1.199E-02	1.198E-02	1.197E-02	1.191E-02	1.175E-02	1.107E-02	0.000E+00

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

\$ is used to indicate summation; the Greek sigma is not included in this font.

Individual Nuclide Soil Concentration										
Parent Nuclide and Branch Fraction Indicated		S(j,t), pCi/g								
ONuclide Parent (j)	BRF(i)	t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Co-60	1.000E+00	8.800E-01	7.715E-01	5.931E-01	2.362E-01	1.702E-02	1.708E-06	6.437E-18	0.000E+00	0.000E+00
OCS-137	1.000E+00	1.660E+01	1.622E+01	1.548E+01	1.316E+01	8.271E+00	1.628E+00	1.565E-02	1.364E-09	0.000E+00
OPu-238	1.000E+00	9.400E-02	9.326E-02	9.180E-02	8.685E-02	7.414E+00	4.262E-02	8.761E-03	3.450E-05	0.000E+00
OU-234	1.000E+00	0.000E+00	2.654E-07	7.894E-07	2.555E-06	7.054E-06	1.783E-05	2.721E-05	2.049E-05	0.000E+00
U-234	1.000E+00	1.600E+00	1.599E+00	1.597E+00	1.591E+00	1.573E+00	1.511E+00	1.348E+00	9.033E-01	0.000E+00
U-238	1.000E+00	0.000E+00	4.477E-06	1.341E-05	4.454E-05	1.321E+00	4.231E-04	1.132E-03	2.532E-03	0.000E+00
U-234	SS(j):	1.600E+00	1.599E+00	1.597E+00	1.591E+00	1.573E+00	1.512E+00	1.349E+00	9.059E-01	0.000E+00
OTH-230	Pu-238	0.000E+00	1.196E-12	1.070E-11	1.166E-10	9.931E-10	9.180E-09	5.259E-08	2.067E-07	0.000E+00
Th-230	U-234	0.000E+00	1.440E-05	4.317E-05	1.436E-04	4.283E-04	1.399E-03	3.965E-03	1.091E-02	0.000E+00
Th-230	U-238	0.000E+00	2.015E-11	1.812E-10	2.008E-09	1.794E-08	1.940E-07	1.619E-06	1.387E-05	0.000E+00
Th-230	SS(j):	0.000E+00	1.440E-05	4.317E-05	1.436E-04	4.284E-04	1.399E-03	3.967E-03	1.093E-02	0.000E+00
ORa-226	Pu-238	0.000E+00	1.728E-16	4.644E-15	1.693E-13	4.369E-12	1.390E-10	2.549E-09	3.496E-08	0.000E+00
Ra-226	U-234	0.000E+00	3.118E-09	2.804E-08	3.106E-07	2.772E-06	2.988E-05	2.468E-04	2.047E-03	0.000E+00
Ra-226	U-238	0.000E+00	2.910E-15	7.850E-14	2.898E-12	7.751E-11	2.779E-09	6.837E-08	1.839E-06	0.000E+00
Ra-226	SS(j):	0.000E+00	3.118E-09	2.804E-08	3.106E-07	2.772E-06	2.988E-05	2.469E-04	2.049E-03	0.000E+00
OPb-210	Pu-238	0.000E+00	1.335E-18	1.064E-16	1.243E-14	8.639E-13	6.637E-11	1.959E-09	3.273E-08	0.000E+00
Pb-210	U-234	0.000E+00	3.206E-17	8.518E-10	2.985E-08	6.940E-07	1.662E-05	2.007E-04	1.932E-03	0.000E+00
Pb-210	U-238	0.000E+00	2.247E-17	1.797E-15	2.120E-13	1.518E-11	1.297E-09	5.090E-08	1.685E-06	0.000E+00
Pb-210	SS(j):	0.000E+00	3.206E-17	8.518E-10	2.985E-08	6.941E-07	1.663E-05	2.008E-04	1.934E-03	0.000E+00
OPo-210	Pu-238	0.000E+00	3.714E-19	5.871E-17	1.014E-14	8.065E-13	6.509E-11	1.947E-09	3.266E-08	0.000E+00
Po-210	U-234	0.000E+00	1.060E-11	5.261E-10	2.553E-08	6.592E-07	1.639E-05	1.998E-04	1.928E-03	0.000E+00
Po-210	U-238	0.000E+00	6.251E-18	9.908E-16	1.728E-13	1.416E-11	1.271E-09	5.056E-08	1.681E-06	0.000E+00
Po-210	SS(j):	0.000E+00	1.060E-11	5.261E-10	2.553E-08	6.593E-07	1.639E-05	1.998E-04	1.930E-03	0.000E+00
OPu-239	Pu-239	7.900E-01	7.900E-01	7.899E-01	7.897E-01	7.891E-01	7.869E-01	7.809E-01	7.599E-01	0.000E+00
OU-235	Pu-239	0.000E+00	7.778E-10	2.332E-09	7.757E-09	2.313E-08	7.548E-08	2.133E-07	5.809E-07	0.000E+00
U-235	U-235	8.000E-02	7.995E-02	7.986E-02	7.955E-02	7.865E-02	7.558E-02	6.745E-02	4.529E-02	0.000E+00
U-235	SS(j):	8.000E-02	7.995E-02	7.986E-02	7.955E-02	7.865E-02	7.558E-02	6.745E-02	4.530E-02	0.000E+00
OPa-231	Pu-239	0.000E+00	8.228E-15	7.400E-14	8.203E-13	7.332E-12	7.954E-11	6.688E-10	5.881E-09	0.000E+00
Pa-231	U-235	0.000E+00	1.692E-06	5.070E-06	1.684E-05	5.003E-05	1.611E-04	4.378E-04	1.033E-03	0.000E+00
Pa-231	SS(j):	0.000E+00	1.692E-06	5.070E-06	1.684E-05	5.003E-05	1.611E-04	4.378E-04	1.033E-03	0.000E+00
OAc-227	Pu-239	0.000E+00	8.661E-17	2.300E-15	8.041E-14	1.861E-12	4.416E-11	5.347E-10	5.417E-09	0.000E+00
Ac-227	U-235	0.000E+00	2.664E-08	2.345E-07	2.414E-06	1.773E-05	1.115E-04	3.867E-04	9.860E-04	0.000E+00
Ac-227	SS(j):	0.000E+00	2.664E-08	2.345E-07	2.414E-06	1.773E-05	1.115E-04	3.867E-04	9.860E-04	0.000E+00
OU-238	U-238	1.580E+00	1.579E+00	1.577E+00	1.571E+00	1.553E+00	1.493E+00	1.332E+00	8.946E-01	0.000E+00

BRF(i) is the branch fraction of the parent nuclide.
S is used to indicate summation; the Greek sigma is not included in this font.
ORESCALC.EXE execution time = 2.48 seconds

Exhibit 2

RESRAD Scenario CAS 08-09-03 Hot Spot 100m²

(24 Pages)

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines
=====

Dose Conversion Factor (and Related) Parameter Summary ...	2
Site-Specific Parameter Summary	5
Summary of Pathway Selections	11
Contaminated Zone and Total Dose Summary	12
Total Dose Components	
Time = 0.000E+00	13
Time = 1.000E+00	14
Time = 3.000E+00	15
Time = 1.000E+01	16
Time = 3.000E+01	17
Time = 1.000E+02	18
Time = 3.000E+02	19
Time = 1.000E+03	20
Dose/Source Ratios Summed Over All Pathways	21
Single Radionuclide Soil Guidelines	22
Dose Per Nuclide Summed Over All Pathways	23
Soil Concentration Per Nuclide	24

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	Co-60	2.190E-04	2.190E-04	DCF2 (2)
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2 (3)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2 (4)
B-1	Pb-210+D	1.380E-02	1.380E-02	DCF2 (5)
B-1	Po-210	9.400E-03	9.400E-03	DCF2 (6)
B-1	Pu-238	3.920E-01	3.920E-01	DCF2 (7)
B-1	Pu-239	4.290E-01	4.290E-01	DCF2 (8)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2 (9)
B-1	Th-230	3.260E-01	3.260E-01	DCF2 (10)
B-1	U-234	1.320E-01	1.320E-01	DCF2 (11)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2 (12)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2 (13)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3 (1)
D-1	Co-60	2.690E-05	2.690E-05	DCF3 (2)
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3 (3)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3 (4)
D-1	Pb-210+D	5.370E-03	5.370E-03	DCF3 (5)
D-1	Po-210	1.900E-03	1.900E-03	DCF3 (6)
D-1	Pu-238	3.200E-03	3.200E-03	DCF3 (7)
D-1	Pu-239	3.540E-03	3.540E-03	DCF3 (8)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3 (9)
D-1	Th-230	5.480E-04	5.480E-04	DCF3 (10)
D-1	U-234	2.830E-04	2.830E-04	DCF3 (11)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3 (12)
D-1	U-238+D	2.690E-04	2.690E-04	DCF3 (13)
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	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF (2,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF (2,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF (2,3)
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF (3,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF (3,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF (3,3)
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF (4,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF (4,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF (4,3)
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF (5,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF (5,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF (5,3)

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

File: FGR 13 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
D-34	Po-210 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (6,1)
D-34	Po-210 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF (6,2)
D-34	Po-210 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.400E-04	3.400E-04	RTF (6,3)
D-34				
D-34	Pu-238 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (7,1)
D-34	Pu-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF (7,2)
D-34	Pu-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF (7,3)
D-34				
D-34	Pu-239 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (8,1)
D-34	Pu-239 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF (8,2)
D-34	Pu-239 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF (8,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF (9,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF (9,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF (9,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(10,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(10,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(10,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(11,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(11,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(11,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(12,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(12,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(12,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(13,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(13,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(13,3)
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	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC (2,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC (2,2)
D-5				
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC (3,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC (3,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC (4,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC (4,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC (5,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC (5,2)
D-5				
D-5	Po-210 , fish	1.000E+02	1.000E+02	BIOFAC (6,1)
D-5	Po-210 , crustacea and mollusks	2.000E+04	2.000E+04	BIOFAC (6,2)
D-5				

Site-Specific Parameter Summary						
	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
0						
Menu						
R011	Area of contaminated zone (m**2)	1.000E+02	1.000E+04	---	---	AREA
R011	Thickness of contaminated zone (m)	3.000E-01	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	2.500E+01	---	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	---	T (2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	---	T (3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	---	T (4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	---	T (5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	---	T (6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	---	T (7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	---	T (8)
R011	Times for calculations (yr)	not used	0.000E+00	---	---	T (9)
R011	Times for calculations (yr)	not used	0.000E+00	---	---	T(10)
R012	Initial principal radionuclide (pCi/g): Co-60	1.120E+00	0.000E+00	---	---	S1 (2)
R012	Initial principal radionuclide (pCi/g): Cs-137	3.710E+01	0.000E+00	---	---	S1 (3)
R012	Initial principal radionuclide (pCi/g): Pu-238	9.400E-02	0.000E+00	---	---	S1 (7)
R012	Initial principal radionuclide (pCi/g): Pu-239	1.180E+00	0.000E+00	---	---	S1 (8)
R012	Initial principal radionuclide (pCi/g): U-234	2.140E+00	0.000E+00	---	---	S1(11)
R012	Initial principal radionuclide (pCi/g): U-235	9.900E-02	0.000E+00	---	---	S1(12)
R012	Initial principal radionuclide (pCi/g): U-238	2.110E+00	0.000E+00	---	---	S1(13)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	---	W1 (2)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	---	W1 (3)
R012	Concentration in groundwater (pCi/L): Pu-238	not used	0.000E+00	---	---	W1 (7)
R012	Concentration in groundwater (pCi/L): Pu-239	not used	0.000E+00	---	---	W1 (8)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	---	W1(11)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	---	W1(12)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	---	W1(13)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00	---	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	---	BCZ
R013	Average annual wind speed (m/sec)	3.500E+00	2.000E+00	---	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	---	EVAPTR
R013	Precipitation (m/yr)	3.000E-02	1.000E+00	---	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	---	RI
R013	Irrigation mode	overhead	overhead	---	---	IDITCH
R013	Runoff coefficient	4.000E-01	2.000E-01	---	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	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

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
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
R015		Unsat. zone 1, thickness (m)	not used	4.000E+00		---	H(1)
R015		Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00		---	DENSUZ(1)
R015		Unsat. zone 1, total porosity	not used	4.000E-01		---	TPUZ(1)
R015		Unsat. zone 1, effective porosity	not used	2.000E-01		---	EPUZ(1)
R015		Unsat. zone 1, field capacity	not used	2.000E-01		---	FCUZ(1)
R015		Unsat. zone 1, soil-specific b parameter	not used	5.300E+00		---	BUZ(1)
R015		Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01		---	HCUZ(1)
R016		Distribution coefficients for Co-60					
R016		Contaminated zone (cm**3/g)	1.000E+03	1.000E+03		---	DCNUCC(2)
R016		Unsaturated zone 1 (cm**3/g)	not used	1.000E+03		---	DCNUCU(2,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+03		---	DCNUCS(2)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		2.422E-04 not used	ALEACH(2)
R016		Solubility constant	0.000E+00	0.000E+00			SOLUBK(2)
R016		Distribution coefficients for Cs-137					
R016		Contaminated zone (cm**3/g)	1.700E+02	1.000E+03		---	DCNUCC(3)
R016		Unsaturated zone 1 (cm**3/g)	not used	1.000E+03		---	DCNUCU(3,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+03		---	DCNUCS(3)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.423E-03 not used	ALEACH(3)
R016		Solubility constant	0.000E+00	0.000E+00			SOLUBK(3)
R016		Distribution coefficients for Pu-238					
R016		Contaminated zone (cm**3/g)	2.000E+03	2.000E+03		---	DCNUCC(7)
R016		Unsaturated zone 1 (cm**3/g)	not used	2.000E+03		---	DCNUCU(7,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+03		---	DCNUCS(7)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.211E-04 not used	ALEACH(7)
R016		Solubility constant	0.000E+00	0.000E+00			SOLUBK(7)
R016		Distribution coefficients for Pu-239					
R016		Contaminated zone (cm**3/g)	2.000E+03	2.000E+03		---	DCNUCC(8)
R016		Unsaturated zone 1 (cm**3/g)	not used	2.000E+03		---	DCNUCU(8,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+03		---	DCNUCS(8)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.211E-04 not used	ALEACH(8)
R016		Solubility constant	0.000E+00	0.000E+00			SOLUBK(8)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
0						
R016	Distribution coefficients for U-234					
R016	Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC (11)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (11,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		6.883E-03	ALEACH (11)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (11)
R016						
R016	Distribution coefficients for U-235					
R016	Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC (12)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (12,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (12)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		6.883E-03	ALEACH (12)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (12)
R016						
R016	Distribution coefficients for U-238					
R016	Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC (13)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (13,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (13)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		6.883E-03	ALEACH (13)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (13)
R016						
R016	Distribution coefficients for daughter Ac-227					
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01		---	DCNUCC (1)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+01		---	DCNUCU (1,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+01		---	DCNUCS (1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		1.200E-02	ALEACH (1)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (1)
R016						
R016	Distribution coefficients for daughter Pa-231					
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01		---	DCNUCC (4)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (4,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		4.826E-03	ALEACH (4)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (4)
R016						
R016	Distribution coefficients for daughter Pb-210					
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02		---	DCNUCC (5)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+02		---	DCNUCU (5,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+02		---	DCNUCS (5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		2.418E-03	ALEACH (5)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (5)
R016						
R016	Distribution coefficients for daughter Po-210					
R016	Contaminated zone (cm**3/g)	1.000E+01	1.000E+01		---	DCNUCC (6)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+01		---	DCNUCU (6,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+01		---	DCNUCS (6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		2.377E-02	ALEACH (6)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (6)

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
R016		Distribution coefficients for daughter Ra-226					
R016		Contaminated zone (cm**3/g)	7.000E+01	7.000E+01		---	DCNUCC (9)
R016		Unsaturated zone 1 (cm**3/g)	not used	7.000E+01		---	DCNUCU (9,1)
R016		Saturated zone (cm**3/g)	not used	7.000E+01		---	DCNUCS (9)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		3.451E-03	ALEACH (9)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (9)
R016		Distribution coefficients for daughter Th-230					
R016		Contaminated zone (cm**3/g)	6.000E+04	6.000E+04		---	DCNUCC (10)
R016		Unsaturated zone 1 (cm**3/g)	not used	6.000E+04		---	DCNUCU (10,1)
R016		Saturated zone (cm**3/g)	not used	6.000E+04		---	DCNUCS (10)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		4.037E-06	ALEACH (10)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (10)
R017		Inhalation rate (m**3/yr)	1.230E+04	8.400E+03		---	INHALR
R017		Mass loading for inhalation (g/m**3)	6.000E-04	1.000E-04		---	MLINH
R017		Exposure duration	2.500E+01	3.000E+01		---	ED
R017		Shielding factor, inhalation	1.000E+00	4.000E-01		---	SHF3
R017		Shielding factor, external gamma	1.000E+00	7.000E-01		---	SHF1
R017		Fraction of time spent indoors	0.000E+00	5.000E-01		---	FIND
R017		Fraction of time spent outdoors (on site)	3.800E-02	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)

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
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)	2.010E+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		---	LF15
R019		Livestock fodder intake for milk (kg/day)	not used	5.500E+01		---	LF16
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		---	WIAM
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

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
C14		C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07		---	EVSN
C14		C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10		---	REVSN
C14		Fraction of grain in beef cattle feed	not used	8.000E-01		---	AVFG4
C14		Fraction of grain in milk cow feed	not used	2.000E-01		---	AVFG5
C14		DCF correction factor for gaseous forms of C14	not used	8.894E+01		---	CO2F
STOR		Storage times of contaminated foodstuffs (days):					
STOR		Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01		---	STOR_T(1)
STOR		Leafy vegetables	1.000E+00	1.000E+00		---	STOR_T(2)
STOR		Milk	1.000E+00	1.000E+00		---	STOR_T(3)
STOR		Meat and poultry	2.000E+01	2.000E+01		---	STOR_T(4)
STOR		Fish	7.000E+00	7.000E+00		---	STOR_T(5)
STOR		Crustacea and mollusks	7.000E+00	7.000E+00		---	STOR_T(6)
STOR		Well water	1.000E+00	1.000E+00		---	STOR_T(7)
STOR		Surface water	1.000E+00	1.000E+00		---	STOR_T(8)
STOR		Livestock fodder	4.500E+01	4.500E+01		---	STOR_T(9)
R021		Thickness of building foundation (m)	not used	1.500E-01		---	FLOOR1
R021		Bulk density of building foundation (g/cm**3)	not used	2.400E+00		---	DENSEFL
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		---	HMX
R021		Average building air exchange rate (1/hr)	not used	5.000E-01		---	REXG
R021		Height of the building (room) (m)	not used	2.500E+00		---	HRM
R021		Building interior area factor	not used	0.000E+00		---	FAI
R021		Building depth below ground surface (m)	not used	-1.000E+00		---	DMFL
R021		Emanating power of Rn-222 gas	not used	2.500E-01		---	EMANA(1)
R021		Emanating power of Rn-220 gas	not used	1.500E-01		---	EMANA(2)
TITL		Number of graphical time points	32	---		---	NPTS
TITL		Maximum number of integration points for dose	17	---		---	LYMAX
TITL		Maximum number of integration points for risk	1	---		---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	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	active
=====	=====

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	100.00 square meters	Co-60	1.120E+00
Thickness:	0.30 meters	Cs-137	3.710E+01
Cover Depth:	0.00 meters	Pu-238	9.400E-02
		Pu-239	1.180E+00
		U-234	2.140E+00
		U-235	9.900E-02
		U-238	2.110E+00

0

Total Dose TDose(t), mrem/yr	
Basic Radiation Dose Limit = 2.500E+01 mrem/yr	
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)	
t (years):	0.000E+00
TDose(t):	4.244E+00
M(t):	1.698E-01
OMaximum TDose(t):	4.244E+00 mrem/yr at t = 0.000E+00 years

3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
3.817E+00	3.067E+00	1.808E+00	3.300E-01	0.000E+00	0.000E+00
1.527E-01	1.227E-01	7.234E-02	1.320E-02	0.000E+00	0.000E+00

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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	4.956E-01	0.1168	4.737E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.156E-06	0.0000
Cs-137	3.714E+00	0.8750	2.410E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.400E-04	0.0000
Pu-238	4.901E-07	0.0000	7.565E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.288E-05	0.0000
Pu-239	1.117E-05	0.0000	1.043E-02	0.0025	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.190E-04	0.0001
U-234	2.759E-05	0.0000	5.803E-03	0.0014	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.610E-05	0.0000
U-235	2.337E-03	0.0006	2.502E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.013E-06	0.0000
U-238	9.587E-03	0.0023	5.115E-03	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.320E-05	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	4.221E+00	0.9946	2.239E-02	0.0053	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.753E-04	0.0001

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.956E-01	0.1168
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.714E+00	0.8750
Pu-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	7.799E-04	0.0002
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.076E-02	0.0025
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.877E-03	0.0014
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	2.590E-03	0.0006
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	1.474E-02	0.0035
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	4.244E+00	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	4.343E-01	0.1061	4.152E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.890E-06	0.0000
Cs-137	3.623E+00	0.8854	2.351E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.366E-04	0.0000
Pu-238	4.862E-07	0.0000	7.505E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.270E-05	0.0000
Pu-239	1.117E-05	0.0000	1.043E-02	0.0025	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.190E-04	0.0001
U-234	2.741E-05	0.0000	5.763E-03	0.0014	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.578E-05	0.0000
U-235	2.321E-03	0.0006	2.485E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.001E-06	0.0000
U-238	9.520E-03	0.0023	5.080E-03	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.291E-05	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	4.069E+00	0.9944	2.230E-02	0.0054	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.708E-04	0.0001

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.343E-01	0.1061
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.623E+00	0.8854
Pu-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	7.737E-04	0.0002
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.076E-02	0.0026
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.836E-03	0.0014
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	2.572E-03	0.0006
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	1.464E-02	0.0036
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	4.092E+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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	3.335E-01	0.0874	3.191E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.452E-06	0.0000
Cs-137	3.449E+00	0.9036	2.239E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.300E-04	0.0000
Pu-238	4.784E-07	0.0000	7.385E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.234E-05	0.0000
Pu-239	1.117E-05	0.0000	1.043E-02	0.0027	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.189E-04	0.0001
U-234	2.705E-05	0.0000	5.685E-03	0.0015	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.516E-05	0.0000
U-235	2.289E-03	0.0006	2.453E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.977E-06	0.0000
U-238	9.386E-03	0.0025	5.010E-03	0.0013	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.232E-05	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	3.794E+00	0.9941	2.213E-02	0.0058	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.622E-04	0.0001

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.335E-01	0.0874
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.449E+00	0.9036
Pu-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	7.613E-04	0.0002
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.076E-02	0.0028
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.757E-03	0.0015
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	2.537E-03	0.0007
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	1.444E-02	0.0038
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	3.817E+00	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	1.323E-01	0.0431	1.269E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.774E-07	0.0000
Cs-137	2.901E+00	0.9460	1.886E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.095E-04	0.0000
Pu-238	4.523E-07	0.0000	6.982E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.112E-05	0.0000
Pu-239	1.115E-05	0.0000	1.042E-02	0.0034	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.186E-04	0.0001
U-234	2.591E-05	0.0000	5.418E-03	0.0018	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.304E-05	0.0000
U-235	2.181E-03	0.0007	2.345E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.898E-06	0.0000
U-238	8.933E-03	0.0029	4.775E-03	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.033E-05	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	3.045E+00	0.9928	2.156E-02	0.0070	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.350E-04	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+01 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.323E-01	0.0431
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.901E+00	0.9461
Pu-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	7.198E-04	0.0002
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.075E-02	0.0035
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.487E-03	0.0018
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	2.418E-03	0.0008
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	1.375E-02	0.0045
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	3.067E+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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	9.408E-03	0.0052	9.100E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.142E-08	0.0000
Cs-137	1.769E+00	0.9781	1.155E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.706E-05	0.0000
Pu-238	3.853E-07	0.0000	5.947E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.799E-05	0.0000
Pu-239	1.111E-05	0.0000	1.039E-02	0.0057	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.176E-04	0.0002
U-234	2.360E-05	0.0000	4.723E-03	0.0026	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.752E-05	0.0000
U-235	1.900E-03	0.0011	2.074E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.701E-06	0.0000
U-238	7.750E-03	0.0043	4.161E-03	0.0023	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.515E-05	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	1.788E+00	0.9886	2.009E-02	0.0111	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.771E-04	0.0003

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.408E-03	0.0052
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.769E+00	0.9781
Pu-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	6.131E-04	0.0003
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.072E-02	0.0059
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	4.784E-03	0.0026
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	2.109E-03	0.0012
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	1.195E-02	0.0066
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	1.808E+00	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	8.818E-07	0.0000	8.994E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.093E-12	0.0000
Cs-137	3.075E-01	0.9319	2.074E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.204E-05	0.0000
Pu-238	2.198E-07	0.0000	3.392E-04	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.026E-05	0.0000
Pu-239	1.088E-05	0.0000	1.028E-02	0.0312	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.143E-04	0.0010
U-234	2.314E-05	0.0001	2.924E-03	0.0089	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.323E-05	0.0001
U-235	1.164E-03	0.0035	1.389E-04	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.188E-06	0.0000
U-238	4.631E-03	0.0140	2.571E-03	0.0078	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.171E-05	0.0001
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	3.133E-01	0.9496	1.625E-02	0.0493	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.827E-04	0.0012

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.818E-07	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.075E-01	0.9320
Pu-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	3.497E-04	0.0011
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.060E-02	0.0321
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.970E-03	0.0090
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	1.304E-03	0.0040
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	7.224E-03	0.0219
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	3.300E-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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
0														

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years
Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
0*	Sum of all water independent and dependent pathways.													

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
0														

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
0*	Sum of all water independent and dependent pathways.													

Dose/Source Ratios Summed Over All Pathways

Parent and Progeny Principal Radionuclide Contributions Indicated

0Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g)									
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03		
Co-60	Co-60	1.000E+00	4.425E-01	3.878E-01	2.977E-01	1.181E-01	8.400E-03	7.874E-07	0.000E+00	0.000E+00		
Os-137	Cs-137	1.000E+00	1.001E-01	9.766E-02	9.296E-02	7.820E-02	4.768E-02	8.288E-03	0.000E+00	0.000E+00		
0Pu-238	Pu-238	1.000E+00	8.297E-03	8.230E-03	8.099E-03	7.657E-03	6.522E-03	3.720E-03	0.000E+00	0.000E+00		
Pu-238	U-234	1.000E+00	3.886E-09	1.158E-08	2.663E-08	7.584E-08	1.898E-07	3.714E-07	0.000E+00	0.000E+00		
Pu-238	Th-230	1.000E+00	2.882E-14	2.009E-13	1.051E-12	9.087E-12	6.946E-11	5.404E-10	0.000E+00	0.000E+00		
Pu-238	Ra-226	1.000E+00	1.515E-16	2.262E-15	2.614E-14	6.697E-13	1.482E-11	3.673E-10	0.000E+00	0.000E+00		
Pu-238	Pb-210	1.000E+00	2.516E-21	7.729E-20	1.909E-18	1.389E-16	8.067E-15	5.007E-13	0.000E+00	0.000E+00		
Pu-238	Po-210	1.000E+00	2.319E-22	1.181E-20	4.357E-19	4.358E-17	2.868E-15	1.868E-13	0.000E+00	0.000E+00		
Pu-238	SDSR(j)		8.297E-03	8.230E-03	8.099E-03	7.657E-03	6.522E-03	3.720E-03	0.000E+00	0.000E+00		
0Pu-239	Pu-239	1.000E+00	9.122E-03	9.121E-03	9.118E-03	9.109E-03	9.081E-03	8.986E-03	0.000E+00	0.000E+00		
Pu-239	U-235	1.000E+00	1.289E-11	3.856E-11	8.935E-11	2.615E-10	7.084E-10	1.837E-09	0.000E+00	0.000E+00		
Pu-239	Pa-231	1.000E+00	1.147E-16	8.001E-16	4.197E-15	3.652E-14	2.846E-13	2.356E-12	0.000E+00	0.000E+00		
Pu-239	Ac-227	1.000E+00	5.511E-18	8.169E-17	9.282E-16	2.241E-14	4.244E-13	7.103E-12	0.000E+00	0.000E+00		
Pu-239	SDSR(j)		9.122E-03	9.121E-03	9.118E-03	9.109E-03	9.081E-03	8.986E-03	0.000E+00	0.000E+00		
0U-234	U-234	1.000E+00	2.746E-03	2.727E-03	2.690E-03	2.563E-03	2.234E-03	1.379E-03	0.000E+00	0.000E+00		
U-234	Th-230	1.000E+00	3.054E-08	9.133E-08	2.117E-07	6.200E-07	1.684E-06	4.437E-06	0.000E+00	0.000E+00		
U-234	Ra-226	1.000E+00	2.139E-10	1.493E-09	7.831E-09	6.819E-08	5.317E-07	4.323E-06	0.000E+00	0.000E+00		
U-234	Pb-210	1.000E+00	4.436E-15	6.592E-14	7.530E-13	1.852E-11	3.680E-10	6.933E-09	0.000E+00	0.000E+00		
U-234	Po-210	1.000E+00	4.728E-16	1.148E-14	1.897E-13	6.079E-12	1.331E-10	2.601E-09	0.000E+00	0.000E+00		
U-234	SDSR(j)		2.746E-03	2.727E-03	2.690E-03	2.564E-03	2.236E-03	1.388E-03	0.000E+00	0.000E+00		
0U-235	U-235	1.000E+00	2.616E-02	2.598E-02	2.562E-02	2.441E-02	2.125E-02	1.299E-02	0.000E+00	0.000E+00		
U-235	Pa-231	1.000E+00	3.490E-07	1.042E-06	2.403E-06	6.918E-06	1.787E-05	3.897E-05	0.000E+00	0.000E+00		
U-235	Ac-227	1.000E+00	2.232E-08	1.538E-07	7.845E-07	6.192E-06	3.717E-05	1.476E-04	0.000E+00	0.000E+00		
U-235	SDSR(j)		2.616E-02	2.598E-02	2.562E-02	2.442E-02	2.130E-02	1.317E-02	0.000E+00	0.000E+00		
0U-238	U-238	1.000E+00	6.988E-03	6.939E-03	6.843E-03	6.516E-03	5.661E-03	3.423E-03	0.000E+00	0.000E+00		
U-238	U-234	1.000E+00	3.888E-09	1.159E-08	2.669E-08	7.630E-08	1.931E-07	3.930E-07	0.000E+00	0.000E+00		
U-238	Th-230	1.000E+00	2.882E-14	2.010E-13	1.053E-12	9.123E-12	7.025E-11	5.599E-10	0.000E+00	0.000E+00		
U-238	Ra-226	1.000E+00	1.515E-16	2.263E-15	2.617E-14	6.717E-13	1.495E-11	3.773E-10	0.000E+00	0.000E+00		
U-238	Pb-210	1.000E+00	2.516E-21	7.732E-20	1.911E-18	1.393E-16	8.123E-15	5.125E-13	0.000E+00	0.000E+00		
U-238	Po-210	1.000E+00	2.320E-22	1.181E-20	4.360E-19	4.368E-17	2.888E-15	1.912E-13	0.000E+00	0.000E+00		
U-238	SDSR(j)		6.988E-03	6.939E-03	6.843E-03	6.516E-03	5.661E-03	3.424E-03	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).
\$ is used to indicate summation; the Greek sigma is not included in this font.
The DSR includes contributions from associated (half-life <= 30 days) daughters.

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

ONuclide									
(i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
Co-60	5.649E+01	6.447E+01	8.396E+01	2.117E+02	2.976E+03	3.175E+07	*1.131E+15	*1.131E+15	
Cs-137	2.497E+02	2.560E+02	2.689E+02	3.197E+02	5.243E+02	3.016E+03	*8.701E+13	*8.701E+13	
Pu-238	3.013E+03	3.038E+03	3.087E+03	3.265E+03	3.833E+03	6.720E+03	*1.711E+13	*1.711E+13	
Pu-239	2.741E+03	2.741E+03	2.742E+03	2.745E+03	2.753E+03	2.782E+03	*6.212E+10	*6.212E+10	
U-234	9.104E+03	9.167E+03	9.293E+03	9.750E+03	1.118E+04	1.801E+04	*6.245E+09	*6.245E+09	
U-235	9.558E+02	9.624E+02	9.757E+02	1.024E+03	1.174E+03	1.898E+03	*2.160E+06	*2.160E+06	
U-238	3.578E+03	3.603E+03	3.653E+03	3.837E+03	4.416E+03	7.302E+03	*3.360E+05	*3.360E+05	
=====	=====	=====	=====	=====	=====	=====	=====	=====	
*At specific activity limit									
0									
Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)									
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g									
at tmin = time of minimum single radionuclide soil guideline									
and at tmax = time of maximum total dose = 0.000E+00 years									
ONuclide	Initial	tmin	DSR(i,tmin)	G(i,tmin)	DSR(i,tmax)	G(i,tmax)			
(i)	(pCi/g)	(years)	(pCi/g)		(pCi/g)				
Co-60	1.120E+00	0.000E+00	4.425E-01	5.649E+01	4.425E-01	5.649E+01			
Cs-137	3.710E+01	0.000E+00	1.001E-01	2.497E+02	1.001E-01	2.497E+02			
Pu-238	9.400E-02	0.000E+00	8.297E-03	3.013E+03	8.297E-03	3.013E+03			
Pu-239	1.180E+00	0.000E+00	9.122E-03	2.741E+03	9.122E-03	2.741E+03			
U-234	2.140E+00	0.000E+00	2.746E-03	9.104E+03	2.746E-03	9.104E+03			
U-235	9.900E-02	0.000E+00	2.616E-02	9.558E+02	2.616E-02	9.558E+02			
U-238	2.110E+00	0.000E+00	6.988E-03	3.578E+03	6.988E-03	3.578E+03			
=====	=====	=====	=====	=====	=====	=====			

Individual Nuclide Dose Summed Over All Pathways

0Nuclide (j)	Parent (i)	BRF(i)	Parent Nuclide and Branch Fraction Indicated							
			DOSE(j,t), mrem/yr							
t=			0.000E+00	1.000E+00	3.000E+00	1.000E+00	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Co-60	Co-60	1.000E+00	4.956E-01	4.343E-01	3.335E-01	1.323E-01	9.408E-03	8.818E-07	0.000E+00	0.000E+00
0Cs-137	Cs-137	1.000E+00	3.714E+00	3.623E+00	3.449E+00	2.901E+00	1.769E+00	3.075E-01	0.000E+00	0.000E+00
0Pu-238	Pu-238	1.000E+00	7.799E-04	7.737E-04	7.613E-04	7.198E-04	6.131E-04	3.497E-04	0.000E+00	0.000E+00
0U-234	Pu-238	1.000E+00	3.653E-10	1.089E-09	2.503E-09	7.129E-09	1.784E-08	3.491E-08	0.000E+00	0.000E+00
U-234	U-234	1.000E+00	5.876E-03	5.836E-03	5.756E-03	5.485E-03	4.780E-03	2.952E-03	0.000E+00	0.000E+00
U-234	U-238	1.000E+00	8.204E-09	2.446E-08	5.631E-08	1.610E-07	4.075E-07	8.293E-07	0.000E+00	0.000E+00
U-234	\$DOSE(j)		5.876E-03	5.836E-03	5.756E-03	5.486E-03	4.780E-03	2.953E-03	0.000E+00	0.000E+00
0Th-230	Pu-238	1.000E+00	2.709E-15	1.889E-14	9.884E-14	8.542E-13	6.530E-12	5.079E-11	0.000E+00	0.000E+00
Th-230	U-234	1.000E+00	6.535E-08	1.954E-07	4.530E-07	1.327E-06	3.603E-06	9.494E-06	0.000E+00	0.000E+00
Th-230	U-238	1.000E+00	6.082E-14	4.241E-13	2.222E-12	1.925E-11	1.482E-10	1.181E-09	0.000E+00	0.000E+00
Th-230	\$DOSE(j)		6.535E-08	1.954E-07	4.530E-07	1.327E-06	3.603E-06	9.496E-06	0.000E+00	0.000E+00
0Ra-226	Pu-238	1.000E+00	1.424E-17	2.127E-16	2.458E-15	6.295E-14	1.393E-12	3.453E-11	0.000E+00	0.000E+00
Ra-226	U-234	1.000E+00	4.578E-10	3.194E-09	1.676E-08	1.459E-07	1.138E-06	9.252E-06	0.000E+00	0.000E+00
Ra-226	U-238	1.000E+00	3.197E-16	4.776E-15	5.522E-14	1.417E-12	3.154E-11	7.962E-10	0.000E+00	0.000E+00
Ra-226	\$DOSE(j)		4.578E-10	3.194E-09	1.676E-08	1.459E-07	1.138E-06	9.253E-06	0.000E+00	0.000E+00
0Pb-210	Pu-238	1.000E+00	2.365E-22	7.265E-21	1.794E-19	1.306E-17	7.583E-16	4.706E-14	0.000E+00	0.000E+00
Pb-210	U-234	1.000E+00	9.493E-15	1.411E-13	1.611E-12	3.963E-11	7.876E-10	1.484E-08	0.000E+00	0.000E+00
Pb-210	U-238	1.000E+00	5.310E-21	1.631E-19	4.031E-18	2.939E-16	1.714E-14	1.081E-12	0.000E+00	0.000E+00
Pb-210	\$DOSE(j)		9.493E-15	1.411E-13	1.611E-12	3.963E-11	7.876E-10	1.484E-08	0.000E+00	0.000E+00
0Po-210	Pu-238	1.000E+00	2.180E-23	1.110E-21	4.095E-20	4.097E-18	2.696E-16	1.756E-14	0.000E+00	0.000E+00
Po-210	U-234	1.000E+00	1.012E-15	2.456E-14	4.060E-13	1.301E-11	2.849E-10	5.565E-09	0.000E+00	0.000E+00
Po-210	U-238	1.000E+00	4.895E-22	2.492E-20	9.200E-19	9.217E-17	6.094E-15	4.035E-13	0.000E+00	0.000E+00
Po-210	\$DOSE(j)		1.012E-15	2.456E-14	4.060E-13	1.301E-11	2.849E-10	5.566E-09	0.000E+00	0.000E+00
0Pu-239	Pu-239	1.000E+00	1.076E-02	1.076E-02	1.076E-02	1.075E-02	1.072E-02	1.060E-02	0.000E+00	0.000E+00
0U-235	Pu-239	1.000E+00	1.522E-11	4.550E-11	1.054E-10	3.086E-10	8.359E-10	2.168E-09	0.000E+00	0.000E+00
U-235	U-235	1.000E+00	2.589E-03	2.572E-03	2.536E-03	2.416E-03	2.103E-03	1.286E-03	0.000E+00	0.000E+00
U-235	\$DOSE(j)		2.589E-03	2.572E-03	2.536E-03	2.416E-03	2.103E-03	1.286E-03	0.000E+00	0.000E+00
0Pa-231	Pu-239	1.000E+00	1.353E-16	9.442E-16	4.952E-15	4.310E-14	3.359E-13	2.780E-12	0.000E+00	0.000E+00
Pa-231	U-235	1.000E+00	3.456E-08	1.031E-07	2.379E-07	6.849E-07	1.769E-06	3.858E-06	0.000E+00	0.000E+00
Pa-231	\$DOSE(j)		3.456E-08	1.031E-07	2.379E-07	6.849E-07	1.769E-06	3.858E-06	0.000E+00	0.000E+00
0Ac-227	Pu-239	1.000E+00	6.503E-18	9.639E-17	1.095E-15	2.644E-14	5.008E-13	8.381E-12	0.000E+00	0.000E+00
Ac-227	U-235	1.000E+00	2.210E-09	1.523E-08	7.767E-08	6.130E-07	3.680E-06	1.461E-05	0.000E+00	0.000E+00
Ac-227	\$DOSE(j)		2.210E-09	1.523E-08	7.767E-08	6.130E-07	3.680E-06	1.461E-05	0.000E+00	0.000E+00
0U-238	U-238	1.000E+00	1.474E-02	1.464E-02	1.444E-02	1.375E-02	1.195E-02	7.223E-03	0.000E+00	0.000E+00

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

\$ is used to indicate summation; the Greek sigma is not included in this font.

Individual Nuclide Soil Concentration									
Parent Nuclide and Branch Fraction Indicated		S(j,t), pCi/g							
0Nuclide Parent (i)	BRF(i)	t= 0.000E+00 1.000E+00 3.000E+00 1.000E+01 3.000E+01 1.000E+02 3.000E+02 1.000E+03							
Co-60	1.000E+00	1.120E+00	9.818E-01	7.543E-01	3.000E-01	2.152E-02	2.126E-06	7.664E-18	0.000E+00
0Cs-137	1.000E+00	3.710E+01	3.620E+01	3.447E+01	2.903E+01	1.777E+01	3.192E+00	2.364E-02	8.259E-10
0Pu-238	1.000E+00	9.400E-02	9.325E-02	9.177E-02	8.675E-02	7.390E-02	4.215E-02	8.474E-03	3.087E-05
0U-234	1.000E+00	0.000E+00	2.645E-07	7.818E-07	2.473E-06	6.393E-06	1.265E-05	8.586E-06	1.628E-07
U-234	1.000E+00	2.140E+00	2.125E+00	2.096E+00	1.998E+00	1.741E+00	1.075E+00	2.712E-01	2.187E-03
U-234	1.000E+00	0.000E+00	5.941E-06	1.758E-05	5.584E-05	1.460E-04	3.005E-04	2.275E-04	6.123E-06
U-234	SS(j) :	2.140E+00	2.125E+00	2.096E+00	1.998E+00	1.741E+00	1.075E+00	2.714E-01	2.194E-03
0Th-230	Pu-238	0.000E+00	1.193E-12	1.064E-11	1.141E-10	9.312E-10	7.413E-09	2.824E-08	4.279E-08
Th-230	U-234	0.000E+00	1.920E-05	5.720E-05	1.861E-04	5.220E-04	1.391E-03	2.437E-03	2.764E-03
Th-230	U-238	0.000E+00	2.680E-11	2.390E-10	2.572E-09	2.114E-08	1.724E-07	6.934E-07	1.116E-06
Th-230	SS(j) :	0.000E+00	1.920E-05	5.720E-05	1.861E-04	5.221E-04	1.392E-03	2.438E-03	2.765E-03
0Ra-226	Pu-238	0.000E+00	1.724E-16	4.611E-15	1.653E-13	4.065E-12	1.093E-10	1.249E-09	4.406E-09
Ra-226	U-234	0.000E+00	4.158E-09	3.715E-08	4.026E-07	3.375E-06	2.942E-05	1.397E-04	2.953E-04
Ra-226	U-238	0.000E+00	3.871E-15	1.036E-13	3.720E-12	9.201E-11	2.520E-09	3.009E-08	1.139E-07
Ra-226	SS(j) :	0.000E+00	4.158E-09	3.715E-08	4.026E-07	3.375E-06	2.942E-05	1.398E-04	2.954E-04
0Pb-210	Pu-238	0.000E+00	1.332E-18	1.057E-16	1.214E-14	8.046E-13	5.233E-11	9.626E-10	4.044E-09
Pb-210	U-234	0.000E+00	4.276E-11	1.129E-09	3.877E-08	8.500E-07	1.658E-05	1.148E-04	2.724E-04
Pb-210	U-238	0.000E+00	2.990E-17	2.373E-15	2.730E-13	1.819E-11	1.202E-09	2.308E-08	1.044E-07
Pb-210	SS(j) :	0.000E+00	4.276E-11	1.129E-09	3.877E-08	8.500E-07	1.658E-05	1.148E-04	2.725E-04
0Po-210	Pu-238	0.000E+00	3.696E-19	5.797E-17	9.815E-15	7.438E-13	5.079E-11	9.468E-10	3.991E-09
Po-210	U-234	0.000E+00	1.409E-11	6.934E-10	3.287E-08	7.996E-07	1.617E-05	1.131E-04	2.688E-04
Po-210	U-238	0.000E+00	8.297E-18	1.302E-15	2.208E-13	1.681E-11	1.167E-09	2.270E-08	1.031E-07
Po-210	SS(j) :	0.000E+00	1.409E-11	6.934E-10	3.287E-08	7.996E-07	1.617E-05	1.131E-04	2.690E-04
0Pu-239	Pu-239	1.180E+00	1.180E+00	1.179E+00	1.178E+00	1.175E+00	1.162E+00	1.128E+00	1.016E+00
0U-235	Pu-239	0.000E+00	1.158E-09	3.450E-09	1.122E-08	3.143E-08	8.331E-08	1.431E-07	1.484E-07
U-235	U-235	9.900E-02	9.832E-02	9.698E-02	9.242E-02	8.053E-02	4.974E-02	1.256E-02	1.015E-04
U-235	SS(j) :	9.900E-02	9.832E-02	9.698E-02	9.242E-02	8.053E-02	4.974E-02	1.256E-02	1.016E-04
0Pa-231	Pu-239	0.000E+00	1.225E-14	1.093E-13	1.182E-12	9.834E-12	8.358E-11	3.701E-10	6.509E-10
Pa-231	U-235	0.000E+00	2.082E-06	6.174E-06	1.975E-05	5.271E-05	1.167E-04	1.099E-04	7.023E-06
Pa-231	SS(j) :	0.000E+00	2.082E-06	6.174E-06	1.975E-05	5.271E-05	1.167E-04	1.099E-04	7.024E-06
0Ac-227	Pu-239	0.000E+00	1.287E-16	3.379E-15	1.138E-13	2.380E-12	4.139E-11	2.472E-10	4.728E-10
Ac-227	U-235	0.000E+00	3.273E-08	2.840E-07	2.781E-06	1.782E-05	7.263E-05	8.384E-05	5.688E-06
Ac-227	SS(j) :	0.000E+00	3.273E-08	2.840E-07	2.781E-06	1.782E-05	7.263E-05	8.384E-05	5.688E-06
0U-238	U-238	2.110E+00	2.096E+00	2.067E+00	1.970E+00	1.716E+00	1.060E+00	2.676E-01	2.163E-03
=====									
BRF(i) is the branch fraction of the parent nuclide.									
S is used to indicate summation; the Greek sigma is not included in this font.									
0RESALC.EXE execution time = 2.71 seconds									

Exhibit 3

RESRAD Scenario CAS 08-09-03 Hot Spot 10m²

(24 Pages)

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines
=====

Dose Conversion Factor (and Related) Parameter Summary ...	2
Site-Specific Parameter Summary	5
Summary of Pathway Selections	11
Contaminated Zone and Total Dose Summary	12
Total Dose Components	
Time = 0.000E+00	13
Time = 1.000E+00	14
Time = 3.000E+00	15
Time = 1.000E+01	16
Time = 3.000E+01	17
Time = 1.000E+02	18
Time = 3.000E+02	19
Time = 1.000E+03	20
Dose/Source Ratios Summed Over All Pathways	21
Single Radionuclide Soil Guidelines	22
Dose Per Nuclide Summed Over All Pathways	23
Soil Concentration Per Nuclide	24

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	Co-60	2.190E-04	2.190E-04	DCF2 (2)
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2 (3)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2 (4)
B-1	Pb-210+D	1.380E-02	1.380E-02	DCF2 (5)
B-1	Po-210	9.400E-03	9.400E-03	DCF2 (6)
B-1	Pu-238	3.920E-01	3.920E-01	DCF2 (7)
B-1	Pu-239	4.290E-01	4.290E-01	DCF2 (8)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2 (9)
B-1	Th-230	3.260E-01	3.260E-01	DCF2 (10)
B-1	U-234	1.320E-01	1.320E-01	DCF2 (11)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2 (12)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2 (13)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3 (1)
D-1	Co-60	2.690E-05	2.690E-05	DCF3 (2)
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3 (3)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3 (4)
D-1	Pb-210+D	5.370E-03	5.370E-03	DCF3 (5)
D-1	Po-210	1.900E-03	1.900E-03	DCF3 (6)
D-1	Pu-238	3.200E-03	3.200E-03	DCF3 (7)
D-1	Pu-239	3.540E-03	3.540E-03	DCF3 (8)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3 (9)
D-1	Th-230	5.480E-04	5.480E-04	DCF3 (10)
D-1	U-234	2.830E-04	2.830E-04	DCF3 (11)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3 (12)
D-1	U-238+D	2.690E-04	2.690E-04	DCF3 (13)
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	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF (2,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF (2,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF (2,3)
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF (3,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF (3,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF (3,3)
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF (4,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF (4,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF (4,3)
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF (5,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF (5,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF (5,3)

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

File: FGR 13 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
D-34	Po-210 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (6,1)
D-34	Po-210 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF (6,2)
D-34	Po-210 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.400E-04	3.400E-04	RTF (6,3)
D-34				
D-34	Pu-238 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (7,1)
D-34	Pu-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF (7,2)
D-34	Pu-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF (7,3)
D-34				
D-34	Pu-239 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (8,1)
D-34	Pu-239 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF (8,2)
D-34	Pu-239 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF (8,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF (9,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF (9,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF (9,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(10,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(10,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(10,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(11,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(11,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(11,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(12,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(12,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(12,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(13,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(13,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(13,3)
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	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC (2,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC (2,2)
D-5				
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC (3,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC (3,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC (4,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC (4,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC (5,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC (5,2)
D-5				
D-5	Po-210 , fish	1.000E+02	1.000E+02	BIOFAC (6,1)
D-5	Po-210 , crustacea and mollusks	2.000E+04	2.000E+04	BIOFAC (6,2)
D-5				

Site-Specific Parameter Summary						
	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
0						
Menu						
R011	Area of contaminated zone (m**2)	1.000E+01	1.000E+04	---		AREA
R011	Thickness of contaminated zone (m)	3.000E-01	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	2.500E+01	---		BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---		TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---		T (2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---		T (3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---		T (4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---		T (5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---		T (6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---		T (7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---		T (8)
R011	Times for calculations (yr)	not used	0.000E+00	---		T (9)
R011	Times for calculations (yr)	not used	0.000E+00	---		T(10)
R012	Initial principal radionuclide (pCi/g): Co-60	1.120E+00	0.000E+00	---		S1 (2)
R012	Initial principal radionuclide (pCi/g): Cs-137	3.710E+01	0.000E+00	---		S1 (3)
R012	Initial principal radionuclide (pCi/g): Pu-238	9.400E-02	0.000E+00	---		S1 (7)
R012	Initial principal radionuclide (pCi/g): Pu-239	1.180E+00	0.000E+00	---		S1 (8)
R012	Initial principal radionuclide (pCi/g): U-234	2.140E+00	0.000E+00	---		S1(11)
R012	Initial principal radionuclide (pCi/g): U-235	9.900E-02	0.000E+00	---		S1(12)
R012	Initial principal radionuclide (pCi/g): U-238	2.110E+00	0.000E+00	---		S1(13)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---		W1 (2)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---		W1 (3)
R012	Concentration in groundwater (pCi/L): Pu-238	not used	0.000E+00	---		W1 (7)
R012	Concentration in groundwater (pCi/L): Pu-239	not used	0.000E+00	---		W1 (8)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---		W1(11)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---		W1(12)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---		W1(13)
R013	Cover depth (m)	0.000E+00	0.000E+00	---		COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---		DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---		VCV
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00	---		DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---		VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---		TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---		FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---		HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---		BCZ
R013	Average annual wind speed (m/sec)	3.500E+00	2.000E+00	---		WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---		HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---		EVAPTR
R013	Precipitation (m/yr)	3.000E-02	1.000E+00	---		PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---		RI
R013	Irrigation mode	overhead	overhead	---		IDITCH
R013	Runoff coefficient	4.000E-01	2.000E-01	---		RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	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

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
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
R015		Unsat. zone 1, thickness (m)	not used	4.000E+00		---	H(1)
R015		Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00		---	DENSUZ(1)
R015		Unsat. zone 1, total porosity	not used	4.000E-01		---	TPUZ(1)
R015		Unsat. zone 1, effective porosity	not used	2.000E-01		---	EPUZ(1)
R015		Unsat. zone 1, field capacity	not used	2.000E-01		---	FCUZ(1)
R015		Unsat. zone 1, soil-specific b parameter	not used	5.300E+00		---	BUZ(1)
R015		Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01		---	HCUZ(1)
R016		Distribution coefficients for Co-60					
R016		Contaminated zone (cm**3/g)	1.000E+03	1.000E+03		---	DCNUCC(2)
R016		Unsat. zone 1 (cm**3/g)	not used	1.000E+03		---	DCNUCU(2,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+03		---	DCNUCS(2)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		2.422E-04	ALEACH(2)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(2)
R016		Distribution coefficients for Cs-137					
R016		Contaminated zone (cm**3/g)	1.700E+02	1.000E+03		---	DCNUCC(3)
R016		Unsat. zone 1 (cm**3/g)	not used	1.000E+03		---	DCNUCU(3,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+03		---	DCNUCS(3)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.423E-03	ALEACH(3)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(3)
R016		Distribution coefficients for Pu-238					
R016		Contaminated zone (cm**3/g)	2.000E+03	2.000E+03		---	DCNUCC(7)
R016		Unsat. zone 1 (cm**3/g)	not used	2.000E+03		---	DCNUCU(7,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+03		---	DCNUCS(7)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.211E-04	ALEACH(7)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(7)
R016		Distribution coefficients for Pu-239					
R016		Contaminated zone (cm**3/g)	2.000E+03	2.000E+03		---	DCNUCC(8)
R016		Unsat. zone 1 (cm**3/g)	not used	2.000E+03		---	DCNUCU(8,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+03		---	DCNUCS(8)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.211E-04	ALEACH(8)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(8)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
0						
R016	Distribution coefficients for U-234					
R016	Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC (11)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (11,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		6.883E-03	ALEACH (11)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (11)
R016						
R016	Distribution coefficients for U-235					
R016	Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC (12)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (12,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (12)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		6.883E-03	ALEACH (12)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (12)
R016						
R016	Distribution coefficients for U-238					
R016	Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC (13)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (13,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (13)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		6.883E-03	ALEACH (13)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (13)
R016						
R016	Distribution coefficients for daughter Ac-227					
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01		---	DCNUCC (1)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+01		---	DCNUCU (1,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+01		---	DCNUCS (1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		1.200E-02	ALEACH (1)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (1)
R016						
R016	Distribution coefficients for daughter Pa-231					
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01		---	DCNUCC (4)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (4,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		4.826E-03	ALEACH (4)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (4)
R016						
R016	Distribution coefficients for daughter Pb-210					
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02		---	DCNUCC (5)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+02		---	DCNUCU (5,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+02		---	DCNUCS (5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		2.418E-03	ALEACH (5)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (5)
R016						
R016	Distribution coefficients for daughter Po-210					
R016	Contaminated zone (cm**3/g)	1.000E+01	1.000E+01		---	DCNUCC (6)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+01		---	DCNUCU (6,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+01		---	DCNUCS (6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		2.377E-02	ALEACH (6)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (6)

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
R016		Distribution coefficients for daughter Ra-226					
R016		Contaminated zone (cm**3/g)	7.000E+01	7.000E+01		---	DCNUCC (9)
R016		Unsaturated zone 1 (cm**3/g)	not used	7.000E+01		---	DCNUCU (9,1)
R016		Saturated zone (cm**3/g)	not used	7.000E+01		---	DCNUCS (9)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		3.451E-03	ALEACH (9)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (9)
R016		Distribution coefficients for daughter Th-230					
R016		Contaminated zone (cm**3/g)	6.000E+04	6.000E+04		---	DCNUCC (10)
R016		Unsaturated zone 1 (cm**3/g)	not used	6.000E+04		---	DCNUCU (10,1)
R016		Saturated zone (cm**3/g)	not used	6.000E+04		---	DCNUCS (10)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		4.037E-06	ALEACH (10)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (10)
R017		Inhalation rate (m**3/yr)	1.230E+04	8.400E+03		---	INHALR
R017		Mass loading for inhalation (g/m**3)	6.000E-04	1.000E-04		---	MLINH
R017		Exposure duration	2.500E+01	3.000E+01		---	ED
R017		Shielding factor, inhalation	1.000E+00	4.000E-01		---	SHF3
R017		Shielding factor, external gamma	1.000E+00	7.000E-01		---	SHF1
R017		Fraction of time spent indoors	0.000E+00	5.000E-01		---	FIND
R017		Fraction of time spent outdoors (on site)	3.800E-02	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)

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
	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)	2.010E+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		---	LF15
	R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01		---	LF16
	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		---	WIAM
	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

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
C14		C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07		---	EVSN
C14		C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10		---	REVSN
C14		Fraction of grain in beef cattle feed	not used	8.000E-01		---	AVFG4
C14		Fraction of grain in milk cow feed	not used	2.000E-01		---	AVFG5
C14		DCF correction factor for gaseous forms of C14	not used	8.894E+01		---	CO2F
STOR		Storage times of contaminated foodstuffs (days):					
STOR		Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01		---	STOR_T(1)
STOR		Leafy vegetables	1.000E+00	1.000E+00		---	STOR_T(2)
STOR		Milk	1.000E+00	1.000E+00		---	STOR_T(3)
STOR		Meat and poultry	2.000E+01	2.000E+01		---	STOR_T(4)
STOR		Fish	7.000E+00	7.000E+00		---	STOR_T(5)
STOR		Crustacea and mollusks	7.000E+00	7.000E+00		---	STOR_T(6)
STOR		Well water	1.000E+00	1.000E+00		---	STOR_T(7)
STOR		Surface water	1.000E+00	1.000E+00		---	STOR_T(8)
STOR		Livestock fodder	4.500E+01	4.500E+01		---	STOR_T(9)
R021		Thickness of building foundation (m)	not used	1.500E-01		---	FLOOR1
R021		Bulk density of building foundation (g/cm**3)	not used	2.400E+00		---	DENSEFL
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		---	HMX
R021		Average building air exchange rate (1/hr)	not used	5.000E-01		---	REXG
R021		Height of the building (room) (m)	not used	2.500E+00		---	HRM
R021		Building interior area factor	not used	0.000E+00		---	FAI
R021		Building depth below ground surface (m)	not used	-1.000E+00		---	DMFL
R021		Emanating power of Rn-222 gas	not used	2.500E-01		---	EMANA(1)
R021		Emanating power of Rn-220 gas	not used	1.500E-01		---	EMANA(2)
TITL		Number of graphical time points	32	---		---	NPTS
TITL		Maximum number of integration points for dose	17	---		---	LYMAX
TITL		Maximum number of integration points for risk	1	---		---	KYMAX

Summary of Pathway Selections

Pathway		User Selection
1 --	external gamma	active
2 --	inhalation (w/o radon)	active
3 --	plant ingestion	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		active
=====		

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	10.00 square meters	Co-60	1.120E+00
Thickness:	0.30 meters	Cs-137	3.710E+01
Cover Depth:	0.00 meters	Pu-238	9.400E-02
		Pu-239	1.180E+00
		U-234	2.140E+00
		U-235	9.900E-02
		U-238	2.110E+00

0

Total Dose TDose(t), mrem/yr	
Basic Radiation Dose Limit = 2.500E+01 mrem/yr	
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)	
t (years):	0.000E+00
TDose(t):	2.366E+00
M(t):	9.464E-02
Maximum TDose(t): 2.366E+00 mrem/yr at t = 0.000E+00 years	

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

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	2.714E-01	0.1147	3.688E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.156E-07	0.0000
Cs-137	2.070E+00	0.8750	1.876E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.400E-05	0.0000
Pu-238	3.282E-07	0.0000	5.889E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.288E-06	0.0000
Pu-239	6.827E-06	0.0000	8.123E-03	0.0034	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.190E-05	0.0000
U-234	1.723E-05	0.0000	4.517E-03	0.0019	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.610E-06	0.0000
U-235	1.359E-03	0.0006	1.948E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.013E-07	0.0000
U-238	5.392E-03	0.0023	3.982E-03	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.320E-06	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	2.348E+00	0.9926	1.743E-02	0.0074	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.753E-05	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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.714E-01	0.1147
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.070E+00	0.8751
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.916E-04	0.0003
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.161E-03	0.0034
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	4.539E-03	0.0019
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	1.554E-03	0.0007
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	9.378E-03	0.0040
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	2.366E+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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	2.377E-01	0.1042	3.233E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.890E-07	0.0000
Cs-137	2.019E+00	0.8852	1.831E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.366E-05	0.0000
Pu-238	3.255E-07	0.0000	5.842E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.270E-06	0.0000
Pu-239	6.825E-06	0.0000	8.121E-03	0.0036	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.190E-05	0.0000
U-234	1.711E-05	0.0000	4.487E-03	0.0020	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.578E-06	0.0000
U-235	1.350E-03	0.0006	1.935E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.001E-07	0.0000
U-238	5.352E-03	0.0023	3.954E-03	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.291E-06	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	2.264E+00	0.9924	1.736E-02	0.0076	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.708E-05	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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.377E-01	0.1042
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.019E+00	0.8852
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.868E-04	0.0003
Pu-239	0.000E+00	0.0000	0.000E+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-03	0.0036
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	4.508E-03	0.0020
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	1.543E-03	0.0007
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	9.311E-03	0.0041
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	2.281E+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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	1.824E-01	0.0858	2.484E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.452E-07	0.0000
Cs-137	1.921E+00	0.9030	1.743E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.300E-05	0.0000
Pu-238	3.204E-07	0.0000	5.749E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.234E-06	0.0000
Pu-239	6.821E-06	0.0000	8.119E-03	0.0038	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.189E-05	0.0000
U-234	1.689E-05	0.0000	4.425E-03	0.0021	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.516E-06	0.0000
U-235	1.331E-03	0.0006	1.909E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.977E-07	0.0000
U-238	5.275E-03	0.0025	3.900E-03	0.0018	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.232E-06	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	2.110E+00	0.9919	1.723E-02	0.0081	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.622E-05	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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.824E-01	0.0858
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.921E+00	0.9030
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.775E-04	0.0003
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.158E-03	0.0038
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	4.447E-03	0.0021
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	1.522E-03	0.0007
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	9.179E-03	0.0043
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	2.127E+00	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	7.220E-02	0.0423	9.877E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.774E-08	0.0000
Cs-137	1.613E+00	0.9442	1.468E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.095E-05	0.0000
Pu-238	3.029E-07	0.0000	5.435E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.112E-06	0.0000
Pu-239	6.806E-06	0.0000	8.111E-03	0.0047	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.186E-05	0.0000
U-234	1.617E-05	0.0000	4.218E-03	0.0025	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.304E-06	0.0000
U-235	1.267E-03	0.0007	1.825E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.898E-07	0.0000
U-238	5.011E-03	0.0029	3.717E-03	0.0022	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.033E-06	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	1.691E+00	0.9901	1.679E-02	0.0098	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.350E-05	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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.220E-02	0.0423
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.613E+00	0.9442
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.460E-04	0.0003
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.149E-03	0.0048
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	4.238E-03	0.0025
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	1.449E-03	0.0008
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	8.732E-03	0.0051
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	1.708E+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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	5.102E-03	0.0051	7.084E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.142E-09	0.0000
Cs-137	9.775E-01	0.9739	8.988E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.706E-06	0.0000
Pu-238	2.580E-07	0.0000	4.630E-04	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.799E-06	0.0000
Pu-239	6.764E-06	0.0000	8.086E-03	0.0081	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.176E-05	0.0000
U-234	1.464E-05	0.0000	3.677E-03	0.0037	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.752E-06	0.0000
U-235	1.100E-03	0.0011	1.615E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.701E-07	0.0000
U-238	4.325E-03	0.0043	3.239E-03	0.0032	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.515E-06	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	9.880E-01	0.9844	1.564E-02	0.0156	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.771E-05	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

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.103E-03	0.0051
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.775E-01	0.9739
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.650E-04	0.0005
Pu-239	0.000E+00	0.0000	0.000E+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-03	0.0081
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	3.695E-03	0.0037
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	1.261E-03	0.0013
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	7.568E-03	0.0075
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	1.004E+00	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	4.675E-07	0.0000	7.001E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.093E-13	0.0000
Cs-137	1.664E-01	0.9127	1.614E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.204E-06	0.0000
Pu-238	1.472E-07	0.0000	2.641E-04	0.0014	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.026E-06	0.0000
Pu-239	6.575E-06	0.0000	8.002E-03	0.0439	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.143E-05	0.0002
U-234	1.360E-05	0.0001	2.276E-03	0.0125	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.323E-06	0.0000
U-235	6.669E-04	0.0037	1.081E-04	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.188E-07	0.0000
U-238	2.540E-03	0.0139	2.001E-03	0.0110	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.171E-06	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	1.697E-01	0.9304	1.265E-02	0.0694	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.827E-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+02 years
Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.675E-07	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.664E-01	0.9127
Pu-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	2.653E-04	0.0015
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.040E-03	0.0441
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.292E-03	0.0126
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	7.751E-04	0.0043
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.544E-03	0.0249
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	1.824E-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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
0														

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years
Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
0*	Sum of all water independent and dependent pathways.													

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
0														

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
0*	Sum of all water independent and dependent pathways.													

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

0Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g)									
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03		
Co-60	Co-60	1.000E+00	2.423E-01	2.123E-01	1.629E-01	6.446E-02	4.556E-03	4.174E-07	0.000E+00	0.000E+00		
Os-137	Cs-137	1.000E+00	5.580E-02	5.443E-02	5.178E-02	4.347E-02	2.635E-02	4.486E-03	0.000E+00	0.000E+00		
0Pu-238	Pu-238	1.000E+00	6.293E-03	6.243E-03	6.143E-03	5.808E-03	4.947E-03	2.822E-03	0.000E+00	0.000E+00		
Pu-238	U-234	1.000E+00	3.002E-09	8.947E-09	2.057E-08	5.859E-08	1.466E-07	2.869E-07	0.000E+00	0.000E+00		
Pu-238	Th-230	1.000E+00	2.228E-14	1.553E-13	8.131E-13	7.028E-12	5.372E-11	4.179E-10	0.000E+00	0.000E+00		
Pu-238	Ra-226	1.000E+00	8.322E-17	1.243E-15	1.435E-14	3.669E-13	8.067E-12	1.957E-10	0.000E+00	0.000E+00		
Pu-238	Pb-210	1.000E+00	1.087E-21	3.339E-20	2.248E-19	6.002E-17	3.485E-15	2.162E-13	0.000E+00	0.000E+00		
Pu-238	Po-210	1.000E+00	1.132E-22	5.764E-21	2.127E-19	2.128E-17	1.400E-15	9.120E-14	0.000E+00	0.000E+00		
Pu-238	SDSR(j)		6.293E-03	6.243E-03	6.143E-03	5.808E-03	4.947E-03	2.822E-03	0.000E+00	0.000E+00		
0Pu-239	Pu-239	1.000E+00	6.916E-03	6.915E-03	6.913E-03	6.906E-03	6.885E-03	6.813E-03	0.000E+00	0.000E+00		
Pu-239	U-235	1.000E+00	7.739E-12	2.314E-11	5.361E-11	1.568E-10	4.236E-10	1.089E-09	0.000E+00	0.000E+00		
Pu-239	Pa-231	1.000E+00	8.321E-17	5.805E-16	3.044E-15	2.649E-14	2.064E-13	1.706E-12	0.000E+00	0.000E+00		
Pu-239	Ac-227	1.000E+00	3.920E-18	5.811E-17	6.602E-16	1.593E-14	3.015E-13	5.032E-12	0.000E+00	0.000E+00		
Pu-239	SDSR(j)		6.916E-03	6.915E-03	6.913E-03	6.906E-03	6.885E-03	6.813E-03	0.000E+00	0.000E+00		
0U-234	U-234	1.000E+00	2.121E-03	2.107E-03	2.078E-03	1.980E-03	1.725E-03	1.065E-03	0.000E+00	0.000E+00		
U-234	Th-230	1.000E+00	2.362E-08	7.063E-08	1.637E-07	4.795E-07	1.302E-06	3.431E-06	0.000E+00	0.000E+00		
U-234	Ra-226	1.000E+00	1.175E-10	8.199E-10	4.299E-09	3.735E-08	2.895E-07	2.303E-06	0.000E+00	0.000E+00		
U-234	Pb-210	1.000E+00	1.917E-15	2.848E-14	3.253E-13	8.002E-12	1.590E-10	2.994E-09	0.000E+00	0.000E+00		
U-234	Po-210	1.000E+00	2.308E-16	5.604E-15	9.263E-14	2.968E-12	6.499E-11	1.269E-09	0.000E+00	0.000E+00		
U-234	SDSR(j)		2.121E-03	2.107E-03	2.078E-03	1.981E-03	1.727E-03	1.071E-03	0.000E+00	0.000E+00		
0U-235	U-235	1.000E+00	1.570E-02	1.559E-02	1.537E-02	1.463E-02	1.270E-02	7.696E-03	0.000E+00	0.000E+00		
U-235	Pa-231	1.000E+00	2.532E-07	7.557E-07	1.743E-06	5.018E-06	1.295E-05	2.822E-05	0.000E+00	0.000E+00		
U-235	Ac-227	1.000E+00	1.588E-08	1.094E-07	5.580E-07	4.402E-06	2.640E-05	1.045E-04	0.000E+00	0.000E+00		
U-235	SDSR(j)		1.570E-02	1.559E-02	1.537E-02	1.464E-02	1.274E-02	7.829E-03	0.000E+00	0.000E+00		
0U-238	U-238	1.000E+00	4.444E-03	4.413E-03	4.350E-03	4.138E-03	3.587E-03	2.153E-03	0.000E+00	0.000E+00		
U-238	U-234	1.000E+00	3.003E-09	8.955E-09	2.061E-08	5.894E-08	1.492E-07	3.036E-07	0.000E+00	0.000E+00		
U-238	Th-230	1.000E+00	2.229E-14	1.554E-13	8.142E-13	7.055E-12	5.433E-11	4.330E-10	0.000E+00	0.000E+00		
U-238	Ra-226	1.000E+00	8.324E-17	1.243E-15	1.437E-14	3.679E-13	8.136E-12	2.010E-10	0.000E+00	0.000E+00		
U-238	Pb-210	1.000E+00	1.087E-21	3.341E-20	8.254E-19	6.017E-17	3.510E-15	2.213E-13	0.000E+00	0.000E+00		
U-238	Po-210	1.000E+00	1.133E-22	5.766E-21	2.129E-19	2.133E-17	1.410E-15	9.335E-14	0.000E+00	0.000E+00		
U-238	SDSR(j)		4.444E-03	4.413E-03	4.350E-03	4.139E-03	3.587E-03	2.153E-03	0.000E+00	0.000E+00		

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*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
\$ is used to indicate summation; the Greek sigma is not included in this font.
The DSR includes contributions from associated (half-life <= 30 days) daughters.

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

ONuclide (i)	t= 0.000E+00		1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Co-60	1.032E+02	1.178E+02	1.535E+02	3.878E+02	5.487E+03	5.989E+07	*1.131E+15	*1.131E+15	*1.131E+15
Cs-137	4.480E+02	4.593E+02	4.828E+02	5.751E+02	9.489E+02	5.573E+03	*8.701E+13	*8.701E+13	*8.701E+13
Pu-238	3.973E+03	4.005E+03	4.069E+03	4.304E+03	5.053E+03	8.859E+03	*1.711E+13	*1.711E+13	*1.711E+13
Pu-239	3.615E+03	3.615E+03	3.616E+03	3.620E+03	3.631E+03	3.669E+03	*6.212E+10	*6.212E+10	*6.212E+10
U-234	1.179E+04	1.187E+04	1.203E+04	1.262E+04	1.448E+04	2.334E+04	*6.245E+09	*6.245E+09	*6.245E+09
U-235	1.592E+03	1.604E+03	1.626E+03	1.708E+03	1.962E+03	3.193E+03	*2.160E+06	*2.160E+06	*2.160E+06
U-238	5.625E+03	5.665E+03	5.747E+03	6.041E+03	6.970E+03	1.161E+04	*3.360E+05	*3.360E+05	*3.360E+05
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
*At specific activity limit									

0

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

ONuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin) (pCi/g)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Co-60	1.120E+00	0.000E+00	2.423E-01	1.032E+02	2.423E-01	1.032E+02
Cs-137	3.710E+01	0.000E+00	5.580E-02	4.480E+02	5.580E-02	4.480E+02
Pu-238	9.400E-02	0.000E+00	6.293E-03	3.973E+03	6.293E-03	3.973E+03
Pu-239	1.180E+00	0.000E+00	6.916E-03	3.615E+03	6.916E-03	3.615E+03
U-234	2.140E+00	0.000E+00	2.121E-03	1.179E+04	2.121E-03	1.179E+04
U-235	9.900E-02	0.000E+00	1.570E-02	1.592E+03	1.570E-02	1.592E+03
U-238	2.110E+00	0.000E+00	4.444E-03	5.625E+03	4.444E-03	5.625E+03
=====	=====	=====	=====	=====	=====	=====

Individual Nuclide Dose Summed Over All Pathways

ONuclide (j)	Parent (i)	BRF(i)	Parent Nuclide and Branch Fraction Indicated								
			DOSE(j,t), mrem/yr								
t=			0.000E+00	1.000E+00	3.000E+00	1.000E+00	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
Co-60	Co-60	1.000E+00	2.714E-01	2.377E-01	1.824E-01	7.220E-02	5.103E-03	4.675E-07	0.000E+00	0.000E+00	
Os-137	Cs-137	1.000E+00	2.070E+00	2.019E+00	1.921E+00	1.613E+00	9.775E-01	1.664E-01	0.000E+00	0.000E+00	
OpU-238	Pu-238	1.000E+00	5.916E-04	5.868E-04	5.775E-04	5.460E-04	4.650E-04	2.652E-04	0.000E+00	0.000E+00	
U-234	Pu-238	1.000E+00	2.822E-10	8.410E-10	1.934E-09	5.507E-09	1.378E-08	2.697E-08	0.000E+00	0.000E+00	
U-234	U-234	1.000E+00	4.539E-03	4.508E-03	4.446E-03	4.237E-03	3.692E-03	2.280E-03	0.000E+00	0.000E+00	
U-234	U-238	1.000E+00	6.337E-09	1.889E-08	4.349E-08	1.244E-07	3.148E-07	6.406E-07	0.000E+00	0.000E+00	
U-234	SDOSE(j)		4.539E-03	4.508E-03	4.446E-03	4.237E-03	3.692E-03	2.281E-03	0.000E+00	0.000E+00	
Th-230	Pu-238	1.000E+00	2.095E-15	1.460E-14	7.644E-14	6.606E-13	5.050E-12	3.928E-11	0.000E+00	0.000E+00	
Th-230	U-234	1.000E+00	5.054E-08	1.511E-07	3.503E-07	1.026E-06	2.786E-06	7.342E-06	0.000E+00	0.000E+00	
Th-230	Th-230	1.000E+00	4.703E-14	3.279E-13	1.718E-12	1.489E-11	1.146E-10	9.136E-10	0.000E+00	0.000E+00	
Th-230	SDOSE(j)		5.054E-08	1.511E-07	3.503E-07	1.026E-06	2.786E-06	7.343E-06	0.000E+00	0.000E+00	
OrA-226	Pu-238	1.000E+00	7.823E-18	1.168E-16	1.349E-15	3.448E-14	7.583E-13	1.839E-11	0.000E+00	0.000E+00	
Ra-226	U-234	1.000E+00	2.516E-10	1.755E-09	9.199E-09	7.993E-08	6.195E-07	4.928E-06	0.000E+00	0.000E+00	
Ra-226	U-238	1.000E+00	1.756E-16	2.623E-15	3.031E-14	7.764E-13	1.717E-11	4.241E-10	0.000E+00	0.000E+00	
Ra-226	SDOSE(j)		2.516E-10	1.755E-09	9.199E-09	7.993E-08	6.195E-07	4.929E-06	0.000E+00	0.000E+00	
OPb-210	Pu-238	1.000E+00	1.022E-22	3.139E-21	7.753E-20	5.642E-18	3.276E-16	2.033E-14	0.000E+00	0.000E+00	
Pb-210	U-234	1.000E+00	4.101E-15	6.094E-14	6.962E-13	1.712E-11	3.403E-10	6.407E-09	0.000E+00	0.000E+00	
Pb-210	U-238	1.000E+00	2.294E-21	7.049E-20	1.742E-18	1.270E-16	7.405E-15	4.670E-13	0.000E+00	0.000E+00	
Pb-210	SDOSE(j)		4.101E-15	6.094E-14	6.962E-13	1.712E-11	3.403E-10	6.408E-09	0.000E+00	0.000E+00	
OPo-210	Pu-238	1.000E+00	1.064E-23	5.418E-22	1.999E-20	2.000E-18	1.316E-16	8.573E-15	0.000E+00	0.000E+00	
Po-210	U-234	1.000E+00	4.940E-16	1.199E-14	1.982E-13	6.351E-12	1.391E-10	2.717E-09	0.000E+00	0.000E+00	
Po-210	U-238	1.000E+00	2.390E-22	1.217E-20	4.492E-19	4.500E-17	2.975E-15	1.970E-13	0.000E+00	0.000E+00	
Po-210	SDOSE(j)		4.940E-16	1.199E-14	1.982E-13	6.351E-12	1.391E-10	2.717E-09	0.000E+00	0.000E+00	
OPu-239	Pu-239	1.000E+00	8.161E-03	8.160E-03	8.158E-03	8.149E-03	8.125E-03	8.040E-03	0.000E+00	0.000E+00	
OU-235	Pu-239	1.000E+00	9.132E-12	2.731E-11	6.326E-11	1.850E-10	4.998E-10	1.285E-09	0.000E+00	0.000E+00	
U-235	U-235	1.000E+00	1.554E-03	1.543E-03	1.522E-03	1.448E-03	1.258E-03	7.620E-04	0.000E+00	0.000E+00	
U-235	SDOSE(j)		1.554E-03	1.543E-03	1.522E-03	1.448E-03	1.258E-03	7.620E-04	0.000E+00	0.000E+00	
OPa-231	Pu-239	1.000E+00	9.818E-17	6.849E-16	3.592E-15	3.126E-14	2.435E-13	2.013E-12	0.000E+00	0.000E+00	
Pa-231	U-235	1.000E+00	2.507E-08	7.481E-08	1.725E-07	4.967E-07	1.282E-06	2.794E-06	0.000E+00	0.000E+00	
Pa-231	SDOSE(j)		2.507E-08	7.481E-08	1.725E-07	4.967E-07	1.282E-06	2.794E-06	0.000E+00	0.000E+00	
OAc-227	Pu-239	1.000E+00	4.626E-18	6.857E-17	7.790E-16	1.880E-14	3.557E-13	5.937E-12	0.000E+00	0.000E+00	
AC-227	U-235	1.000E+00	1.572E-09	1.083E-08	5.524E-08	4.358E-07	2.614E-06	1.035E-05	0.000E+00	0.000E+00	
AC-227	SDOSE(j)		1.572E-09	1.083E-08	5.524E-08	4.358E-07	2.614E-06	1.035E-05	0.000E+00	0.000E+00	
OU-238	U-238	1.000E+00	9.378E-03	9.311E-03	9.179E-03	8.732E-03	7.568E-03	4.543E-03	0.000E+00	0.000E+00	

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

\$ is used to indicate summation; the Greek sigma is not included in this font.

Individual Nuclide Soil Concentration												
Parent Nuclide and Branch Fraction Indicated		S(j,t), pCi/g										
ONuclide	Parent	BRF(i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03		
(j)	(i)											
Co-60	Co-60	1.000E+00	1.120E+00	9.818E-01	7.543E-01	3.000E-01	2.152E-02	2.126E-06	7.664E-18	0.000E+00		
OCs-137	Cs-137	1.000E+00	3.710E+01	3.620E+01	3.447E+01	2.903E+01	1.777E+01	3.192E+00	2.364E-02	8.259E-10		
OPu-238	Pu-238	1.000E+00	9.400E-02	9.325E-02	9.177E-02	8.675E-02	7.390E-02	4.215E-02	8.474E-03	3.087E-05		
OU-234	Pu-238	1.000E+00	0.000E+00	2.645E-07	7.818E-07	2.473E-06	6.393E-06	1.265E-05	8.586E-06	1.628E-07		
U-234	U-234	1.000E+00	2.140E+00	2.125E+00	2.096E+00	1.998E+00	1.741E+00	1.075E+00	2.712E-01	2.187E-03		
U-234	U-234	1.000E+00	0.000E+00	5.941E-06	1.758E-05	5.584E-05	1.460E-04	3.005E-04	2.275E-04	6.123E-06		
U-234	SS(j) :		2.140E+00	2.125E+00	2.096E+00	1.998E+00	1.741E+00	1.075E+00	2.714E-01	2.194E-03		
0Th-230	Pu-238	1.000E+00	0.000E+00	1.193E-12	1.064E-11	1.141E-10	9.312E-10	7.413E-09	2.824E-08	4.279E-08		
Th-230	U-234	1.000E+00	0.000E+00	1.920E-05	5.720E-05	1.861E-04	5.220E-04	1.391E-03	2.437E-03	2.764E-03		
Th-230	U-238	1.000E+00	0.000E+00	2.680E-11	2.390E-10	2.572E-09	2.114E-08	1.724E-07	6.934E-07	1.116E-06		
Th-230	SS(j) :		0.000E+00	1.920E-05	5.720E-05	1.861E-04	5.221E-04	1.392E-03	2.438E-03	2.765E-03		
0Ra-226	Pu-238	1.000E+00	0.000E+00	1.724E-16	4.611E-15	1.653E-13	4.065E-12	1.093E-10	1.249E-09	4.406E-09		
Ra-226	U-234	1.000E+00	0.000E+00	4.158E-09	3.715E-08	4.026E-07	3.375E-06	2.942E-05	1.397E-04	2.953E-04		
Ra-226	U-238	1.000E+00	0.000E+00	3.871E-15	1.036E-13	3.720E-12	9.201E-11	2.520E-09	3.009E-08	1.139E-07		
Ra-226	SS(j) :		0.000E+00	4.158E-09	3.715E-08	4.026E-07	3.375E-06	2.942E-05	1.398E-04	2.954E-04		
0Pb-210	Pu-238	1.000E+00	0.000E+00	1.332E-18	1.057E-16	1.214E-14	8.046E-13	5.233E-11	9.626E-10	4.044E-09		
Pb-210	U-234	1.000E+00	0.000E+00	4.276E-11	1.129E-09	3.877E-08	8.500E-07	1.658E-05	1.148E-04	2.724E-04		
Pb-210	U-238	1.000E+00	0.000E+00	2.990E-17	2.373E-15	2.730E-13	1.819E-11	1.202E-09	2.308E-08	1.044E-07		
Pb-210	SS(j) :		0.000E+00	4.276E-11	1.129E-09	3.877E-08	8.500E-07	1.658E-05	1.148E-04	2.725E-04		
0Po-210	Pu-238	1.000E+00	0.000E+00	3.696E-19	5.797E-17	9.815E-15	7.438E-13	5.079E-11	9.468E-10	3.991E-09		
Po-210	U-234	1.000E+00	0.000E+00	1.409E-11	6.934E-10	3.287E-08	7.996E-07	1.617E-05	1.131E-04	2.688E-04		
Po-210	U-238	1.000E+00	0.000E+00	8.297E-18	1.302E-15	2.208E-13	1.681E-11	1.167E-09	2.270E-08	1.031E-07		
Po-210	SS(j) :		0.000E+00	1.409E-11	6.934E-10	3.287E-08	7.996E-07	1.617E-05	1.131E-04	2.690E-04		
0Pu-239	Pu-239	1.000E+00	1.180E+00	1.180E+00	1.179E+00	1.178E+00	1.175E+00	1.162E+00	1.128E+00	1.016E+00		
0U-235	Pu-239	1.000E+00	0.000E+00	1.158E-09	3.450E-09	1.122E-08	3.143E-08	8.331E-08	1.431E-07	1.484E-07		
U-235	U-235	1.000E+00	9.900E-02	9.832E-02	9.698E-02	9.242E-02	8.053E-02	4.974E-02	1.256E-02	1.015E-04		
U-235	SS(j) :		9.900E-02	9.832E-02	9.698E-02	9.242E-02	8.053E-02	4.974E-02	1.256E-02	1.016E-04		
0Pa-231	Pu-239	1.000E+00	0.000E+00	1.225E-14	1.093E-13	1.182E-12	9.834E-12	8.358E-11	3.701E-10	6.509E-10		
Pa-231	U-235	1.000E+00	0.000E+00	2.082E-06	6.174E-06	1.975E-05	5.271E-05	1.167E-04	1.099E-04	7.023E-06		
Pa-231	SS(j) :		0.000E+00	2.082E-06	6.174E-06	1.975E-05	5.271E-05	1.167E-04	1.099E-04	7.024E-06		
0Ac-227	Pu-239	1.000E+00	0.000E+00	1.287E-16	3.379E-15	1.138E-13	2.380E-12	4.139E-11	2.472E-10	4.728E-10		
Ac-227	U-235	1.000E+00	0.000E+00	3.273E-08	2.840E-07	2.781E-06	1.782E-05	7.263E-05	8.384E-05	5.688E-06		
Ac-227	SS(j) :		0.000E+00	3.273E-08	2.840E-07	2.781E-06	1.782E-05	7.263E-05	8.384E-05	5.688E-06		
0U-238	U-238	1.000E+00	2.110E+00	2.096E+00	2.067E+00	1.970E+00	1.716E+00	1.060E+00	2.676E-01	2.163E-03		
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
BRF(i) is the branch fraction of the parent nuclide.												
\$ is used to indicate summation; the Greek sigma is not included in this font.												
RESCALC.EXE execution time = 2.59 seconds												

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

S is used to indicate summation; the Greek sigma is not included in this font.

0RESALC.EXE execution time = 2.59 seconds

Exhibit 4

RESRAD Scenario CAS 08-09-03 Hot Spot 1m²

(24 Pages)

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines
=====

Dose Conversion Factor (and Related) Parameter Summary ...	2
Site-Specific Parameter Summary	5
Summary of Pathway Selections	11
Contaminated Zone and Total Dose Summary	12
Total Dose Components	
Time = 0.000E+00	13
Time = 1.000E+00	14
Time = 3.000E+00	15
Time = 1.000E+01	16
Time = 3.000E+01	17
Time = 1.000E+02	18
Time = 3.000E+02	19
Time = 1.000E+03	20
Dose/Source Ratios Summed Over All Pathways	21
Single Radionuclide Soil Guidelines	22
Dose Per Nuclide Summed Over All Pathways	23
Soil Concentration Per Nuclide	24

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	Co-60	2.190E-04	2.190E-04	DCF2 (2)
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2 (3)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2 (4)
B-1	Pb-210+D	1.380E-02	1.380E-02	DCF2 (5)
B-1	Po-210	9.400E-03	9.400E-03	DCF2 (6)
B-1	Pu-238	3.920E-01	3.920E-01	DCF2 (7)
B-1	Pu-239	4.290E-01	4.290E-01	DCF2 (8)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2 (9)
B-1	Th-230	3.260E-01	3.260E-01	DCF2 (10)
B-1	U-234	1.320E-01	1.320E-01	DCF2 (11)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2 (12)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2 (13)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3 (1)
D-1	Co-60	2.690E-05	2.690E-05	DCF3 (2)
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3 (3)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3 (4)
D-1	Pb-210+D	5.370E-03	5.370E-03	DCF3 (5)
D-1	Po-210	1.900E-03	1.900E-03	DCF3 (6)
D-1	Pu-238	3.200E-03	3.200E-03	DCF3 (7)
D-1	Pu-239	3.540E-03	3.540E-03	DCF3 (8)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3 (9)
D-1	Th-230	5.480E-04	5.480E-04	DCF3 (10)
D-1	U-234	2.830E-04	2.830E-04	DCF3 (11)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3 (12)
D-1	U-238+D	2.690E-04	2.690E-04	DCF3 (13)
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	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF (2,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF (2,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF (2,3)
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF (3,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF (3,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF (3,3)
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF (4,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF (4,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF (4,3)
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF (5,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF (5,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF (5,3)

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

File: FGR 13 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
D-34	Po-210 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (6,1)
D-34	Po-210 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF (6,2)
D-34	Po-210 , milk/livestock-intake ratio, (pCi/L) / (pCi/d)	3.400E-04	3.400E-04	RTF (6,3)
D-34				
D-34	Pu-238 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (7,1)
D-34	Pu-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF (7,2)
D-34	Pu-238 , milk/livestock-intake ratio, (pCi/L) / (pCi/d)	1.000E-06	1.000E-06	RTF (7,3)
D-34				
D-34	Pu-239 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (8,1)
D-34	Pu-239 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF (8,2)
D-34	Pu-239 , milk/livestock-intake ratio, (pCi/L) / (pCi/d)	1.000E-06	1.000E-06	RTF (8,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF (9,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF (9,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L) / (pCi/d)	1.000E-03	1.000E-03	RTF (9,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(10,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(10,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L) / (pCi/d)	5.000E-06	5.000E-06	RTF(10,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(11,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(11,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L) / (pCi/d)	6.000E-04	6.000E-04	RTF(11,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(12,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(12,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L) / (pCi/d)	6.000E-04	6.000E-04	RTF(12,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(13,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(13,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L) / (pCi/d)	6.000E-04	6.000E-04	RTF(13,3)
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	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC (2,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC (2,2)
D-5				
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC (3,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC (3,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC (4,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC (4,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC (5,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC (5,2)
D-5				
D-5	Po-210 , fish	1.000E+02	1.000E+02	BIOFAC (6,1)
D-5	Po-210 , crustacea and mollusks	2.000E+04	2.000E+04	BIOFAC (6,2)
D-5				

Site-Specific Parameter Summary									
Menu	Parameter	User Input	Default	(If different from user input)		Used by RESRAD		Parameter Name	
0									
R011	Area of contaminated zone (m**2)	1.000E+00	1.000E+04			---		AREA	
R011	Thickness of contaminated zone (m)	3.000E-01	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	2.500E+01			---		BRDL	
R011	Time since placement of material (yr)	0.000E+00	0.000E+00			---		TI	
R011	Times for calculations (yr)	1.000E+00	1.000E+00			---		T (2)	
R011	Times for calculations (yr)	3.000E+00	3.000E+00			---		T (3)	
R011	Times for calculations (yr)	1.000E+01	1.000E+01			---		T (4)	
R011	Times for calculations (yr)	3.000E+01	3.000E+01			---		T (5)	
R011	Times for calculations (yr)	1.000E+02	1.000E+02			---		T (6)	
R011	Times for calculations (yr)	3.000E+02	3.000E+02			---		T (7)	
R011	Times for calculations (yr)	1.000E+03	1.000E+03			---		T (8)	
R011	Times for calculations (yr)	not used	0.000E+00			---		T (9)	
R011	Times for calculations (yr)	not used	0.000E+00			---		T(10)	
R012	Initial principal radionuclide (pCi/g): Co-60	1.120E+00	0.000E+00			---		S1 (2)	
R012	Initial principal radionuclide (pCi/g): Cs-137	3.710E+01	0.000E+00			---		S1 (3)	
R012	Initial principal radionuclide (pCi/g): Pu-238	9.400E-02	0.000E+00			---		S1 (7)	
R012	Initial principal radionuclide (pCi/g): Pu-239	1.180E+00	0.000E+00			---		S1 (8)	
R012	Initial principal radionuclide (pCi/g): U-234	2.140E+00	0.000E+00			---		S1(11)	
R012	Initial principal radionuclide (pCi/g): U-235	9.900E-02	0.000E+00			---		S1(12)	
R012	Initial principal radionuclide (pCi/g): U-238	2.110E+00	0.000E+00			---		S1(13)	
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00			---		W1 (2)	
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00			---		W1 (3)	
R012	Concentration in groundwater (pCi/L): Pu-238	not used	0.000E+00			---		W1 (7)	
R012	Concentration in groundwater (pCi/L): Pu-239	not used	0.000E+00			---		W1 (8)	
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00			---		W1(11)	
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00			---		W1(12)	
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00			---		W1(13)	
R013	Cover depth (m)	0.000E+00	0.000E+00			---		COVER0	
R013	Density of cover material (g/cm**3)	not used	1.500E+00			---		DENSCV	
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03			---		VCV	
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00			---		DENSCZ	
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03			---		VCZ	
R013	Contaminated zone total porosity	4.000E-01	4.000E-01			---		TPCZ	
R013	Contaminated zone field capacity	2.000E-01	2.000E-01			---		FCCZ	
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01			---		HCCZ	
R013	Contaminated zone b parameter	5.300E+00	5.300E+00			---		BCZ	
R013	Average annual wind speed (m/sec)	3.500E+00	2.000E+00			---		WIND	
R013	Humidity in air (g/m**3)	not used	8.000E+00			---		HUMID	
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01			---		EVAPTR	
R013	Precipitation (m/yr)	3.000E-02	1.000E+00			---		PRECIP	
R013	Irrigation mode	2.000E-01	2.000E-01			---		RI	
R013	Irrigation mode	overhead	overhead			---		IDITCH	
R013	Runoff coefficient	4.000E-01	2.000E-01			---		RUNOFF	
R013	Watershed area for nearby stream or pond (m**2)	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	

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
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
R015		Unsat. zone 1, thickness (m)	not used	4.000E+00		---	H(1)
R015		Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00		---	DENSUZ(1)
R015		Unsat. zone 1, total porosity	not used	4.000E-01		---	TPUZ(1)
R015		Unsat. zone 1, effective porosity	not used	2.000E-01		---	EPUZ(1)
R015		Unsat. zone 1, field capacity	not used	2.000E-01		---	FCUZ(1)
R015		Unsat. zone 1, soil-specific b parameter	not used	5.300E+00		---	BUZ(1)
R015		Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01		---	HCUZ(1)
R016		Distribution coefficients for Co-60					
R016		Contaminated zone (cm**3/g)	1.000E+03	1.000E+03		---	DCNUCC(2)
R016		Unsat. zone 1 (cm**3/g)	not used	1.000E+03		---	DCNUCU(2,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+03		---	DCNUCS(2)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		2.422E-04	ALEACH(2)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(2)
R016		Distribution coefficients for Cs-137					
R016		Contaminated zone (cm**3/g)	1.700E+02	1.000E+03		---	DCNUCC(3)
R016		Unsat. zone 1 (cm**3/g)	not used	1.000E+03		---	DCNUCU(3,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+03		---	DCNUCS(3)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.423E-03	ALEACH(3)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(3)
R016		Distribution coefficients for Pu-238					
R016		Contaminated zone (cm**3/g)	2.000E+03	2.000E+03		---	DCNUCC(7)
R016		Unsat. zone 1 (cm**3/g)	not used	2.000E+03		---	DCNUCU(7,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+03		---	DCNUCS(7)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.211E-04	ALEACH(7)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(7)
R016		Distribution coefficients for Pu-239					
R016		Contaminated zone (cm**3/g)	2.000E+03	2.000E+03		---	DCNUCC(8)
R016		Unsat. zone 1 (cm**3/g)	not used	2.000E+03		---	DCNUCU(8,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+03		---	DCNUCS(8)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.211E-04	ALEACH(8)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(8)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
0						
R016	Distribution coefficients for U-234					
R016	Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC (11)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (11,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		6.883E-03	ALEACH (11)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (11)
R016						
R016	Distribution coefficients for U-235					
R016	Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC (12)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (12,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (12)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		6.883E-03	ALEACH (12)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (12)
R016						
R016	Distribution coefficients for U-238					
R016	Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC (13)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (13,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (13)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		6.883E-03	ALEACH (13)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (13)
R016						
R016	Distribution coefficients for daughter Ac-227					
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01		---	DCNUCC (1)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+01		---	DCNUCU (1,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+01		---	DCNUCS (1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		1.200E-02	ALEACH (1)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (1)
R016						
R016	Distribution coefficients for daughter Pa-231					
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01		---	DCNUCC (4)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (4,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		4.826E-03	ALEACH (4)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (4)
R016						
R016	Distribution coefficients for daughter Pb-210					
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02		---	DCNUCC (5)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+02		---	DCNUCU (5,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+02		---	DCNUCS (5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		2.418E-03	ALEACH (5)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (5)
R016						
R016	Distribution coefficients for daughter Po-210					
R016	Contaminated zone (cm**3/g)	1.000E+01	1.000E+01		---	DCNUCC (6)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+01		---	DCNUCU (6,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+01		---	DCNUCS (6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		2.377E-02	ALEACH (6)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (6)

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
R016		Distribution coefficients for daughter Ra-226					
R016		Contaminated zone (cm**3/g)	7.000E+01	7.000E+01		---	DCNUCC (9)
R016		Unsaturated zone 1 (cm**3/g)	not used	7.000E+01		---	DCNUCU (9,1)
R016		Saturated zone (cm**3/g)	not used	7.000E+01		---	DCNUCS (9)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		3.451E-03	ALEACH (9)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (9)
R016		Distribution coefficients for daughter Th-230					
R016		Contaminated zone (cm**3/g)	6.000E+04	6.000E+04		---	DCNUCC (10)
R016		Unsaturated zone 1 (cm**3/g)	not used	6.000E+04		---	DCNUCU (10,1)
R016		Saturated zone (cm**3/g)	not used	6.000E+04		---	DCNUCS (10)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		4.037E-06	ALEACH (10)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (10)
R017		Inhalation rate (m**3/yr)	1.230E+04	8.400E+03		---	INHALR
R017		Mass loading for inhalation (g/m**3)	6.000E-04	1.000E-04		---	MLINH
R017		Exposure duration	2.500E+01	3.000E+01		---	ED
R017		Shielding factor, inhalation	1.000E+00	4.000E-01		---	SHF3
R017		Shielding factor, external gamma	1.000E+00	7.000E-01		---	SHF1
R017		Fraction of time spent indoors	0.000E+00	5.000E-01		---	FIND
R017		Fraction of time spent outdoors (on site)	3.800E-02	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)

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
	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)	2.010E+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		---	LF15
	R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01		---	LF16
	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		---	WIAM
	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

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
C14		C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07		---	EVSN
C14		C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10		---	REVSN
C14		Fraction of grain in beef cattle feed	not used	8.000E-01		---	AVFG4
C14		Fraction of grain in milk cow feed	not used	2.000E-01		---	AVFG5
C14		DCF correction factor for gaseous forms of C14	not used	8.894E+01		---	CO2F
STOR		Storage times of contaminated foodstuffs (days):					
STOR		Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01		---	STOR_T(1)
STOR		Leafy vegetables	1.000E+00	1.000E+00		---	STOR_T(2)
STOR		Milk	1.000E+00	1.000E+00		---	STOR_T(3)
STOR		Meat and poultry	2.000E+01	2.000E+01		---	STOR_T(4)
STOR		Fish	7.000E+00	7.000E+00		---	STOR_T(5)
STOR		Crustacea and mollusks	7.000E+00	7.000E+00		---	STOR_T(6)
STOR		Well water	1.000E+00	1.000E+00		---	STOR_T(7)
STOR		Surface water	1.000E+00	1.000E+00		---	STOR_T(8)
STOR		Livestock fodder	4.500E+01	4.500E+01		---	STOR_T(9)
R021		Thickness of building foundation (m)	not used	1.500E-01		---	FLOOR1
R021		Bulk density of building foundation (g/cm**3)	not used	2.400E+00		---	DENSEFL
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		---	HMX
R021		Average building air exchange rate (1/hr)	not used	5.000E-01		---	REXG
R021		Height of the building (room) (m)	not used	2.500E+00		---	HRM
R021		Building interior area factor	not used	0.000E+00		---	FAI
R021		Building depth below ground surface (m)	not used	-1.000E+00		---	DMFL
R021		Emanating power of Rn-222 gas	not used	2.500E-01		---	EMANA(1)
R021		Emanating power of Rn-220 gas	not used	1.500E-01		---	EMANA(2)
TITL		Number of graphical time points	32	---		---	NPTS
TITL		Maximum number of integration points for dose	17	---		---	LYMAX
TITL		Maximum number of integration points for risk	1	---		---	KYMAX

Summary of Pathway Selections

Pathway		User Selection
1 --	external gamma	active
2 --	inhalation (w/o radon)	active
3 --	plant ingestion	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		active
=====		

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	1.00 square meters	Co-60	1.120E+00
Thickness:	0.30 meters	Cs-137	3.710E+01
Cover Depth:	0.00 meters	Pu-238	9.400E-02
		Pu-239	1.180E+00
		U-234	2.140E+00
		U-235	9.900E-02
		U-238	2.110E+00

0

Total Dose TDose(t), mrem/yr	
Basic Radiation Dose Limit = 2.500E+01 mrem/yr	
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)	
t (years):	0.000E+00 1.000E+00 3.000E+00 1.000E+01 3.000E+01 1.000E+02 3.000E+02 1.000E+03
TDose(t):	5.096E-01 4.916E-01 4.590E-01 3.699E-01 2.199E-01 4.498E-02 0.000E+00 0.000E+00
M(t):	2.038E-02 1.966E-02 1.836E-02 1.480E-02 8.797E-03 1.799E-03 0.000E+00 0.000E+00
OMaximum TDose(t): 5.096E-01 mrem/yr at t = 0.000E+00 years	

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

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	5.645E-02	0.1108	2.862E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.156E-08	0.0000
Cs-137	4.381E-01	0.8598	1.456E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.400E-06	0.0000
Pu-238	8.538E-08	0.0000	4.571E-04	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.288E-07	0.0000
Pu-239	1.587E-06	0.0000	6.304E-03	0.0124	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.190E-06	0.0000
U-234	4.188E-06	0.0000	3.506E-03	0.0069	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.610E-07	0.0000
U-235	2.953E-04	0.0006	1.511E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.013E-08	0.0000
U-238	1.156E-03	0.0023	3.090E-03	0.0061	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.320E-07	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	4.960E-01	0.9734	1.353E-02	0.0265	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.753E-06	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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.646E-02	0.1108
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.381E-01	0.8598
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.574E-04	0.0009
Pu-239	0.000E+00	0.0000	0.000E+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	0.0124
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	3.511E-03	0.0069
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	4.465E-04	0.0009
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.246E-03	0.0083
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	5.096E-01	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	4.944E-02	0.1006	2.509E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.890E-08	0.0000
Cs-137	4.272E-01	0.8691	1.421E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.366E-06	0.0000
Pu-238	8.470E-08	0.0000	4.534E-04	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.270E-07	0.0000
Pu-239	1.586E-06	0.0000	6.303E-03	0.0128	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.190E-06	0.0000
U-234	4.160E-06	0.0000	3.482E-03	0.0071	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.578E-07	0.0000
U-235	2.932E-04	0.0006	1.501E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.001E-08	0.0000
U-238	1.147E-03	0.0023	3.069E-03	0.0062	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.291E-07	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	4.781E-01	0.9726	1.347E-02	0.0274	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.708E-06	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

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.945E-02	0.1006
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.272E-01	0.8691
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.537E-04	0.0009
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.308E-03	0.0128
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	3.487E-03	0.0071
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	4.434E-04	0.0009
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.216E-03	0.0086
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	4.916E-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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	3.793E-02	0.0826	1.928E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.452E-08	0.0000
Cs-137	4.062E-01	0.8851	1.353E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.300E-06	0.0000
Pu-238	8.335E-08	0.0000	4.462E-04	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.234E-07	0.0000
Pu-239	1.585E-06	0.0000	6.301E-03	0.0137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.189E-06	0.0000
U-234	4.105E-06	0.0000	3.434E-03	0.0075	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.516E-07	0.0000
U-235	2.890E-04	0.0006	1.482E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.977E-08	0.0000
U-238	1.130E-03	0.0025	3.027E-03	0.0066	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.232E-07	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	4.456E-01	0.9709	1.337E-02	0.0291	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.622E-06	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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.793E-02	0.0826
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.063E-01	0.8851
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.465E-04	0.0010
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.306E-03	0.0137
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	3.439E-03	0.0075
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	4.372E-04	0.0010
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.157E-03	0.0091
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.590E-01	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	1.499E-02	0.0405	7.665E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.774E-09	0.0000
Cs-137	3.406E-01	0.9206	1.139E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.095E-06	0.0000
Pu-238	7.880E-08	0.0000	4.218E-04	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.112E-07	0.0000
Pu-239	1.580E-06	0.0000	6.294E-03	0.0170	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.186E-06	0.0000
U-234	3.927E-06	0.0000	3.273E-03	0.0088	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.304E-07	0.0000
U-235	2.747E-04	0.0007	1.417E-04	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.898E-08	0.0000
U-238	1.072E-03	0.0029	2.885E-03	0.0078	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.033E-07	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	3.569E-01	0.9648	1.303E-02	0.0352	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.350E-06	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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.499E-02	0.0405
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.406E-01	0.9206
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.221E-04	0.0011
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.299E-03	0.0170
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	3.278E-03	0.0089
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	4.164E-04	0.0011
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	3.957E-03	0.0107
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	3.699E-01	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	1.055E-03	0.0048	5.498E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.142E-10	0.0000
Cs-137	2.056E-01	0.9347	6.976E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.706E-07	0.0000
Pu-238	6.713E-08	0.0000	3.593E-04	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.799E-07	0.0000
Pu-239	1.567E-06	0.0000	6.276E-03	0.0285	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.176E-06	0.0000
U-234	3.537E-06	0.0000	2.854E-03	0.0130	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.752E-07	0.0000
U-235	2.376E-04	0.0011	1.253E-04	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.701E-08	0.0000
U-238	9.222E-04	0.0042	2.514E-03	0.0114	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.515E-07	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	2.078E-01	0.9448	1.213E-02	0.0552	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.771E-06	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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.055E-03	0.0048
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.056E-01	0.9347
Pu-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	3.596E-04	0.0016
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.280E-03	0.0286
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.858E-03	0.0130
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	3.630E-04	0.0017
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	3.436E-03	0.0156
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	2.199E-01	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	9.527E-08	0.0000	5.434E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.093E-14	0.0000
Cs-137	3.447E-02	0.7664	1.253E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.204E-07	0.0000
Pu-238	3.829E-08	0.0000	2.050E-04	0.0046	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.026E-07	0.0000
Pu-239	1.511E-06	0.0000	6.210E-03	0.1381	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.143E-06	0.0001
U-234	3.115E-06	0.0001	1.767E-03	0.0393	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.323E-07	0.0000
U-235	1.422E-04	0.0032	8.390E-05	0.0019	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.188E-08	0.0000
U-238	5.349E-04	0.0119	1.553E-03	0.0345	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.171E-07	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	3.516E-02	0.7816	9.820E-03	0.2183	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.827E-06	0.0001

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.527E-08	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.448E-02	0.7665
Pu-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	2.051E-04	0.0046
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.215E-03	0.1382
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	1.770E-03	0.0393
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	2.261E-04	0.0050
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	2.088E-03	0.0464
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	4.498E-02	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
0														

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years
Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
0*	Sum of all water independent and dependent pathways.													

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
0														

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
0*	Sum of all water independent and dependent pathways.													

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

0Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g)									
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03		
Co-60	Co-60	1.000E+00	5.041E-02	4.415E-02	3.386E-02	1.338E-02	9.421E-04	8.507E-08	0.000E+00	0.000E+00		
Os-137	Cs-137	1.000E+00	1.181E-02	1.152E-02	1.095E-02	9.180E-03	5.541E-03	9.293E-04	0.000E+00	0.000E+00		
0Pu-238	Pu-238	1.000E+00	4.866E-03	4.827E-03	4.750E-03	4.491E-03	3.825E-03	2.182E-03	0.000E+00	0.000E+00		
Pu-238	U-234	1.000E+00	2.322E-09	6.919E-09	1.591E-08	4.531E-08	1.134E-07	2.219E-07	0.000E+00	0.000E+00		
Pu-238	Th-230	1.000E+00	1.723E-14	1.201E-13	6.287E-13	5.433E-12	4.153E-11	3.231E-10	0.000E+00	0.000E+00		
Pu-238	Ra-226	1.000E+00	1.742E-17	2.601E-16	3.002E-15	7.664E-14	1.679E-12	4.015E-11	0.000E+00	0.000E+00		
Pu-238	Pb-210	1.000E+00	5.848E-22	1.797E-20	4.437E-19	3.229E-17	1.875E-15	1.164E-13	0.000E+00	0.000E+00		
Pu-238	Po-210	1.000E+00	8.087E-23	4.117E-21	1.519E-19	1.520E-17	1.000E-15	6.515E-14	0.000E+00	0.000E+00		
Pu-238	SDSR(j)	1.000E+00	4.866E-03	4.827E-03	4.750E-03	4.491E-03	3.825E-03	2.182E-03	0.000E+00	0.000E+00		
0Pu-239	Pu-239	1.000E+00	5.346E-03	5.346E-03	5.344E-03	5.338E-03	5.322E-03	5.267E-03	0.000E+00	0.000E+00		
Pu-239	U-235	1.000E+00	2.223E-12	6.647E-12	1.540E-11	4.500E-11	1.214E-10	3.109E-10	0.000E+00	0.000E+00		
Pu-239	Pa-231	1.000E+00	5.776E-17	4.029E-16	2.113E-15	1.839E-14	1.433E-13	1.188E-12	0.000E+00	0.000E+00		
Pu-239	Ac-227	1.000E+00	2.497E-18	3.702E-17	4.206E-16	1.015E-14	1.922E-13	3.221E-12	0.000E+00	0.000E+00		
Pu-239	SDSR(j)	1.000E+00	5.346E-03	5.346E-03	5.344E-03	5.338E-03	5.322E-03	5.267E-03	0.000E+00	0.000E+00		
0U-234	U-234	1.000E+00	1.640E-03	1.629E-03	1.607E-03	1.531E-03	1.334E-03	8.240E-04	0.000E+00	0.000E+00		
U-234	Th-230	1.000E+00	1.826E-08	5.461E-08	1.266E-07	3.707E-07	1.007E-06	2.653E-06	0.000E+00	0.000E+00		
U-234	Ra-226	1.000E+00	2.460E-11	1.716E-10	8.993E-10	7.803E-09	6.024E-08	4.725E-07	0.000E+00	0.000E+00		
U-234	Pb-210	1.000E+00	1.031E-15	1.532E-14	1.750E-13	4.305E-12	8.555E-11	1.612E-09	0.000E+00	0.000E+00		
U-234	Po-210	1.000E+00	1.649E-16	4.002E-15	6.615E-14	2.119E-12	4.642E-11	9.068E-10	0.000E+00	0.000E+00		
U-234	SDSR(j)	1.000E+00	1.640E-03	1.629E-03	1.607E-03	1.532E-03	1.335E-03	8.271E-04	0.000E+00	0.000E+00		
0U-235	U-235	1.000E+00	4.510E-03	4.478E-03	4.414E-03	4.199E-03	3.641E-03	2.198E-03	0.000E+00	0.000E+00		
U-235	Pa-231	1.000E+00	1.758E-07	5.246E-07	1.210E-06	3.484E-06	8.996E-06	1.965E-05	0.000E+00	0.000E+00		
U-235	Ac-227	1.000E+00	1.011E-08	6.969E-08	3.555E-07	2.805E-06	1.683E-05	6.693E-05	0.000E+00	0.000E+00		
U-235	SDSR(j)	1.000E+00	4.510E-03	4.478E-03	4.416E-03	4.206E-03	3.666E-03	2.284E-03	0.000E+00	0.000E+00		
0U-238	U-238	1.000E+00	2.012E-03	1.998E-03	1.970E-03	1.875E-03	1.629E-03	9.894E-04	0.000E+00	0.000E+00		
U-238	U-234	1.000E+00	2.323E-09	6.925E-09	1.594E-08	4.558E-08	1.154E-07	2.348E-07	0.000E+00	0.000E+00		
U-238	Th-230	1.000E+00	1.723E-14	1.202E-13	6.295E-13	5.455E-12	4.200E-11	3.348E-10	0.000E+00	0.000E+00		
U-238	Ra-226	1.000E+00	1.742E-17	2.602E-16	3.005E-15	7.687E-14	1.693E-12	4.124E-11	0.000E+00	0.000E+00		
U-238	Pb-210	1.000E+00	5.849E-22	1.797E-20	4.441E-19	3.237E-17	1.888E-15	1.192E-13	0.000E+00	0.000E+00		
U-238	Po-210	1.000E+00	8.088E-23	4.118E-21	1.520E-19	1.523E-17	1.007E-15	6.668E-14	0.000E+00	0.000E+00		
U-238	SDSR(j)	1.000E+00	2.012E-03	1.998E-03	1.970E-03	1.876E-03	1.629E-03	9.896E-04	0.000E+00	0.000E+00		

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*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
\$ is used to indicate summation; the Greek sigma is not included in this font.
The DSR includes contributions from associated (half-life <= 30 days) daughters.

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

ONuclide (i)	t= 0.000E+00					1.000E+00					3.000E+00					1.000E+01					3.000E+02					1.000E+03					
Co-60	4.959E+02	5.663E+02	7.382E+02	1.868E+03	2.654E+04	2.939E+08	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	
Cs-137	2.117E+03	2.171E+03	2.283E+03	2.723E+03	4.512E+03	2.690E+04	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	
Pu-238	5.138E+03	5.179E+03	5.263E+03	5.567E+03	6.536E+03	1.146E+04	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	
Pu-239	4.676E+03	4.677E+03	4.678E+03	4.683E+03	4.697E+03	4.747E+03	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	
U-234	1.524E+04	1.534E+04	1.556E+04	1.632E+04	1.872E+04	3.023E+04	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	
U-235	5.543E+03	5.582E+03	5.661E+03	5.944E+03	6.819E+03	1.094E+04	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	
U-238	1.242E+04	1.251E+04	1.269E+04	1.333E+04	1.535E+04	2.526E+04	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	
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*At specific activity limit

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

ONuclide (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)
Co-60	1.120E+00	0.000E+00	5.041E-02	4.959E+02	5.041E-02	4.959E+02
Cs-137	3.710E+01	0.000E+00	1.181E-02	2.117E+03	1.181E-02	2.117E+03
Pu-238	9.400E-02	0.000E+00	4.866E-03	5.138E+03	4.866E-03	5.138E+03
Pu-239	1.180E+00	0.000E+00	5.346E-03	4.676E+03	5.346E-03	4.676E+03
U-234	2.140E+00	0.000E+00	1.640E-03	1.524E+04	1.640E-03	1.524E+04
U-235	9.900E-02	0.000E+00	4.510E-03	5.543E+03	4.510E-03	5.543E+03
U-238	2.110E+00	0.000E+00	2.012E-03	1.242E+04	2.012E-03	1.242E+04
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Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

ONuclide	Parent (i)	BRF (i)	DOSE(j, t), mrem/yr									
			t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
Co-60	Co-60	1.000E+00	5.646E-02	4.945E-02	3.793E-02	1.499E-02	1.055E-02	1.055E-03	9.527E-08	0.000E+00	0.000E+00	
0Cs-137	Cs-137	1.000E+00	4.381E-01	4.272E-01	4.063E-01	3.406E-01	2.056E-01	2.056E-01	3.448E-02	0.000E+00	0.000E+00	
0Pu-238	Pu-238	1.000E+00	4.574E-04	4.537E-04	4.465E-04	4.221E-04	3.596E-04	3.596E-04	2.051E-04	0.000E+00	0.000E+00	
0U-234	Pu-238	1.000E+00	2.182E-10	6.504E-10	1.496E-09	4.259E-09	1.066E-08	2.085E-08	0.000E+00	0.000E+00	0.000E+00	
U-234	U-234	1.000E+00	3.511E-03	3.486E-03	3.439E-03	3.277E-03	2.855E-03	2.855E-03	1.763E-03	0.000E+00	0.000E+00	
U-234	U-238	1.000E+00	4.901E-09	1.461E-08	3.364E-08	9.617E-08	2.434E-07	4.954E-07	0.000E+00	0.000E+00	0.000E+00	
U-234	\$DOSE(j)		3.511E-03	3.486E-03	3.439E-03	3.277E-03	2.856E-03	2.856E-03	1.764E-03	0.000E+00	0.000E+00	
0Th-230	Pu-238	1.000E+00	1.619E-15	1.129E-14	5.909E-14	5.107E-13	3.904E-12	3.037E-11	0.000E+00	0.000E+00	0.000E+00	
Th-230	U-234	1.000E+00	3.907E-08	1.169E-07	2.708E-07	7.933E-07	2.154E-06	5.677E-06	0.000E+00	0.000E+00	0.000E+00	
Th-230	U-238	1.000E+00	3.636E-14	2.535E-13	1.328E-12	1.151E-11	8.863E-11	7.063E-10	0.000E+00	0.000E+00	0.000E+00	
Th-230	\$DOSE(j)		3.907E-08	1.169E-07	2.708E-07	7.933E-07	2.154E-06	5.677E-06	0.000E+00	0.000E+00	0.000E+00	
0Ra-226	Pu-238	1.000E+00	1.637E-18	2.445E-17	2.822E-16	7.204E-15	1.578E-13	3.774E-12	0.000E+00	0.000E+00	0.000E+00	
Ra-226	U-234	1.000E+00	5.265E-11	3.672E-10	1.924E-09	1.670E-08	1.289E-07	1.011E-06	0.000E+00	0.000E+00	0.000E+00	
Ra-226	U-238	1.000E+00	3.676E-17	5.490E-16	6.341E-15	1.622E-13	3.573E-12	8.702E-11	0.000E+00	0.000E+00	0.000E+00	
Ra-226	\$DOSE(j)		5.265E-11	3.672E-10	1.924E-09	1.670E-08	1.289E-07	1.011E-06	0.000E+00	0.000E+00	0.000E+00	
0Pb-210	Pu-238	1.000E+00	5.497E-23	1.689E-21	4.171E-20	3.036E-18	1.763E-16	1.094E-14	0.000E+00	0.000E+00	0.000E+00	
Pb-210	U-234	1.000E+00	2.207E-15	3.279E-14	3.746E-13	9.213E-12	1.831E-10	3.450E-09	0.000E+00	0.000E+00	0.000E+00	
Pb-210	U-238	1.000E+00	1.234E-21	3.792E-20	9.371E-19	6.831E-17	3.984E-15	2.514E-13	0.000E+00	0.000E+00	0.000E+00	
Pb-210	\$DOSE(j)		2.207E-15	3.279E-14	3.746E-13	9.213E-12	1.831E-10	3.450E-09	0.000E+00	0.000E+00	0.000E+00	
0Po-210	Pu-238	1.000E+00	7.602E-24	3.870E-22	1.428E-20	1.428E-18	9.401E-17	6.124E-15	0.000E+00	0.000E+00	0.000E+00	
Po-210	U-234	1.000E+00	3.528E-16	8.565E-15	1.416E-13	4.535E-12	9.933E-11	1.940E-09	0.000E+00	0.000E+00	0.000E+00	
Po-210	U-238	1.000E+00	1.707E-22	8.689E-21	3.208E-19	3.214E-17	2.125E-15	1.407E-13	0.000E+00	0.000E+00	0.000E+00	
Po-210	\$DOSE(j)		3.528E-16	8.565E-15	1.416E-13	4.535E-12	9.933E-11	1.941E-09	0.000E+00	0.000E+00	0.000E+00	
0Pu-239	Pu-239	1.000E+00	6.309E-03	6.308E-03	6.306E-03	6.299E-03	6.280E-03	6.215E-03	0.000E+00	0.000E+00	0.000E+00	
0U-235	Pu-239	1.000E+00	2.623E-12	7.844E-12	1.817E-11	5.310E-11	1.432E-10	3.669E-10	0.000E+00	0.000E+00	0.000E+00	
U-235	U-235	1.000E+00	4.465E-04	4.433E-04	4.370E-04	4.157E-04	3.604E-04	2.176E-04	0.000E+00	0.000E+00	0.000E+00	
U-235	\$DOSE(j)		4.465E-04	4.433E-04	4.370E-04	4.157E-04	3.604E-04	2.176E-04	0.000E+00	0.000E+00	0.000E+00	
0Pa-231	Pu-239	1.000E+00	6.816E-17	4.755E-16	2.494E-15	2.170E-14	1.691E-13	1.402E-12	0.000E+00	0.000E+00	0.000E+00	
Pa-231	U-235	1.000E+00	1.740E-08	5.193E-08	1.198E-07	3.449E-07	8.907E-07	1.946E-06	0.000E+00	0.000E+00	0.000E+00	
Pa-231	\$DOSE(j)		1.740E-08	5.193E-08	1.198E-07	3.449E-07	8.907E-07	1.946E-06	0.000E+00	0.000E+00	0.000E+00	
0Ac-227	Pu-239	1.000E+00	2.947E-18	4.368E-17	4.963E-16	1.198E-14	2.268E-13	3.801E-12	0.000E+00	0.000E+00	0.000E+00	
Ac-227	U-235	1.000E+00	1.001E-09	6.899E-09	3.519E-08	2.777E-07	1.666E-06	6.626E-06	0.000E+00	0.000E+00	0.000E+00	
Ac-227	\$DOSE(j)		1.001E-09	6.899E-09	3.519E-08	2.777E-07	1.666E-06	6.626E-06	0.000E+00	0.000E+00	0.000E+00	
0U-238	U-238	1.000E+00	4.246E-03	4.216E-03	4.157E-03	3.957E-03	3.436E-03	2.088E-03	0.000E+00	0.000E+00	0.000E+00	

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

\$ is used to indicate summation; the Greek sigma is not included in this font.

Individual Nuclide Soil Concentration

Parent Nuclide and Branch Fraction Indicated		S(j,t), pCi/g									
0Nuclide Parent (i)	BRF(i)	t= 0.000E+00 1.000E+00 3.000E+00 1.000E+01 3.000E+01 1.000E+02 3.000E+02 1.000E+03									
Co-60	1.000E+00	1.120E+00	9.818E-01	7.543E-01	3.000E-01	2.152E-02	2.126E-06	7.664E-18	0.000E+00		
0Cs-137	1.000E+00	3.710E+01	3.620E+01	3.447E+01	2.903E+01	1.777E+01	3.192E+00	2.364E-02	8.259E-10		
0Pu-238	1.000E+00	9.400E-02	9.325E-02	9.177E-02	8.675E-02	7.390E-02	4.215E-02	8.474E-03	3.087E-05		
0U-234	1.000E+00	0.000E+00	2.645E-07	7.818E-07	2.473E-06	6.393E-06	1.265E-05	8.586E-06	1.628E-07		
U-234	1.000E+00	2.140E+00	2.125E+00	2.096E+00	1.998E+00	1.741E+00	1.075E+00	2.712E-01	2.187E-03		
U-234	1.000E+00	0.000E+00	5.941E-06	1.758E-05	5.584E-05	1.460E-04	3.005E-04	2.275E-04	6.123E-06		
U-234	SS(j) :	2.140E+00	2.125E+00	2.096E+00	1.998E+00	1.741E+00	1.075E+00	2.714E-01	2.194E-03		
0Th-230	Pu-238	0.000E+00	1.193E-12	1.064E-11	1.141E-10	9.312E-10	7.413E-09	2.824E-08	4.279E-08		
Th-230	U-234	0.000E+00	1.920E-05	5.720E-05	1.861E-04	5.220E-04	1.391E-03	2.437E-03	2.764E-03		
Th-230	U-238	0.000E+00	2.680E-11	2.390E-10	2.572E-09	2.114E-08	1.724E-07	6.934E-07	1.116E-06		
Th-230	SS(j) :	0.000E+00	1.920E-05	5.720E-05	1.861E-04	5.221E-04	1.392E-03	2.438E-03	2.765E-03		
0Ra-226	Pu-238	0.000E+00	1.724E-16	4.611E-15	1.653E-13	4.065E-12	1.093E-10	1.249E-09	4.406E-09		
Ra-226	U-234	0.000E+00	4.158E-09	3.715E-08	4.026E-07	3.375E-06	2.942E-05	1.397E-04	2.953E-04		
Ra-226	U-238	0.000E+00	3.871E-15	1.036E-13	3.720E-12	9.201E-11	2.520E-09	3.009E-08	1.139E-07		
Ra-226	SS(j) :	0.000E+00	4.158E-09	3.715E-08	4.026E-07	3.375E-06	2.942E-05	1.398E-04	2.954E-04		
0Pb-210	Pu-238	0.000E+00	1.332E-18	1.057E-16	1.214E-14	8.046E-13	5.233E-11	9.626E-10	4.044E-09		
Pb-210	U-234	0.000E+00	4.276E-11	1.129E-09	3.877E-08	8.500E-07	1.658E-05	1.148E-04	2.724E-04		
Pb-210	U-238	0.000E+00	2.990E-17	2.373E-15	2.730E-13	1.819E-11	1.202E-09	2.308E-08	1.044E-07		
Pb-210	SS(j) :	0.000E+00	4.276E-11	1.129E-09	3.877E-08	8.500E-07	1.658E-05	1.148E-04	2.725E-04		
0Po-210	Pu-238	0.000E+00	3.696E-19	5.797E-17	9.815E-15	7.438E-13	5.079E-11	9.468E-10	3.991E-09		
Po-210	U-234	0.000E+00	1.409E-11	6.934E-10	3.287E-08	7.996E-07	1.617E-05	1.131E-04	2.688E-04		
Po-210	U-238	0.000E+00	8.297E-18	1.302E-15	2.208E-13	1.681E-11	1.167E-09	2.270E-08	1.031E-07		
Po-210	SS(j) :	0.000E+00	1.409E-11	6.934E-10	3.287E-08	7.996E-07	1.617E-05	1.131E-04	2.690E-04		
0Pu-239	Pu-239	1.180E+00	1.180E+00	1.179E+00	1.178E+00	1.175E+00	1.162E+00	1.128E+00	1.016E+00		
0U-235	Pu-239	0.000E+00	1.158E-09	3.450E-09	1.122E-08	3.143E-08	8.331E-08	1.431E-07	1.484E-07		
U-235	U-235	9.900E-02	9.832E-02	9.698E-02	9.242E-02	8.053E-02	4.974E-02	1.256E-02	1.015E-04		
U-235	SS(j) :	9.900E-02	9.832E-02	9.698E-02	9.242E-02	8.053E-02	4.974E-02	1.256E-02	1.016E-04		
0Pa-231	Pu-239	0.000E+00	1.225E-14	1.093E-13	1.182E-12	9.834E-12	8.358E-11	3.701E-10	6.509E-10		
Pa-231	U-235	0.000E+00	2.082E-06	6.174E-06	1.975E-05	5.271E-05	1.167E-04	1.099E-04	7.023E-06		
Pa-231	SS(j) :	0.000E+00	2.082E-06	6.174E-06	1.975E-05	5.271E-05	1.167E-04	1.099E-04	7.024E-06		
0Ac-227	Pu-239	0.000E+00	1.287E-16	3.379E-15	1.138E-13	2.380E-12	4.139E-11	2.472E-10	4.728E-10		
Ac-227	U-235	0.000E+00	3.273E-08	2.840E-07	2.781E-06	1.782E-05	7.263E-05	8.384E-05	5.688E-06		
Ac-227	SS(j) :	0.000E+00	3.273E-08	2.840E-07	2.781E-06	1.782E-05	7.263E-05	8.384E-05	5.688E-06		
0U-238	U-238	2.110E+00	2.096E+00	2.067E+00	1.970E+00	1.716E+00	1.060E+00	2.676E-01	2.163E-03		

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

\$ is used to indicate summation; the Greek sigma is not included in this font.

0RESALC.EXE execution time = 2.56 seconds

Residual Radioactive Material
Guidelines for CAS 10-09-02

Derivation of Residual Radioactive Material Guidelines for Radionuclides in Soil at the
Corrective Action Site (CAS) 10-09-02 of the Corrective Action Unit (CAU) 357, Mud Pits
and Waste Dump, Nevada Test Site, Nevada

February 1, 2005

Work sponsored by U.S. Department of Energy, National Nuclear Security Administration
Nevada Site Office, Environmental Restoration Division, Las Vegas, Nevada.

Introduction

Residual radioactive material guidelines for fission products, activation products, and isotopes of uranium, plutonium, and americium were derived for CAS 10-09-02 located in Area 10 of the NTS. This site became contaminated with fission products, activation products, and isotopes of uranium and plutonium from drilling activities conducted in support of underground nuclear weapons testing at the NTS. Radionuclide specific guidelines were derived to meet the requirement that the TEDE to a hypothetical individual working in the identified areas of contamination at this CAS should not exceed an annual dose of 25 mrem/yr.

The TEDE is defined as the sum of the EDE from external radiation and the CEDE from internal radiation. A dose equivalent is the radiation dose absorbed by a tissue multiplied by a dimensionless quality factor that represents the biological effectiveness of the radiation type (i.e., alpha particles, photons) for causing stochastic biological effects such as cancer or heredity effects. The EDE is the weighted sum of the dose equivalents to different organs and tissues, where the weighing factor is the ratio of the stochastic risk for an individual tissue to the total stochastic risk for all tissue following whole body irradiation. The CEDE is the dose equivalent to organs and tissues that will be received by an individual from an intake of radioactive material during the 50-year period following the intake.

The RESRAD computer code (version 6.22) was developed by Argonne National Laboratory for the DOE. RESRAD implements the dose assessment methodology described in DOE Order 5400.5, "Radiation Protection of the Public and the Environment" (DOE, 1993) and is used to implement residual radioactive material guidelines contained in the order. The exposure scenario selected for this site, which is based on the future land use at the site, indicated that the 25-mrem/yr dose constraint would not be exceeded within 1,000 years for the single radionuclide guidelines. The scenario was chosen based on the consideration of all significant exposures to the critical population group via the following pathways:

- Direct exposure to external radiation from the contaminated soil
- Internal dose from inhalation of airborne radionuclides
- Internal dose from ingestion of contaminated soil

Because sitewide residual radioactive material guidelines for fission products, activation products, and isotopes of uranium, plutonium, and americium have not been established for the NTS, guidelines for this CAS have been derived on a site-specific basis. The derived guidelines represent the residual concentrations of the following radionuclides: americium-241, cobalt-60, cesium-137, plutonium-238, plutonium-239, strontium-90, uranium-234, uranium-235, and uranium-238. The radionuclides are assumed to be in a homogeneously contaminated volume at a concentration that must not be exceeded if the dose criterion is not to be exceeded. The radionuclides evaluated for this site were obtained from the sample analysis results associated with the characterization of this CAS. The highest concentration (maximum sampling result) for each detected radionuclide was used for the hot spot analysis, while the average concentration (mean + 95 percent confidence interval) for each radionuclide was used to perform dose and risk calculations.

Table 1. Input Concentrations for CAS 10-09-02

Dose and Risk Calculation		Hot Spot Calculation	
Radionuclide	Average Activity Concentration (pCi/g)	Radionuclide	Maximum Activity Concentration (pCi/g)
Americium-241	5.900E+00	Americium-241	7.130E+00
Cobalt-60	1.630E-01	Cobalt-60	1.600E-01
Cesium-137	9.300E+00	Cesium-137	1.940E+01
Plutonium-238	2.100E+00	Plutonium-238	4.010E+00
Plutonium-239	1.010E+01	Plutonium-239	2.500E+01
Strontium-90	1.900E+00	Strontium-90	2.520E+00
Uranium-234	1.100E+00	Uranium-234	1.290E+00
Uranium-235	1.000E-01	Uranium-235	1.270E-01
Uranium-238	1.100E+00	Uranium-238	1.380E+00

The scenario for this CAS addresses long-term exposure to workers exposed to residual levels of radionuclides in soil during an average workday outdoors onsite and that at some time within 1,000 years the site will be released for use without radiological restrictions following remediation.

The scenario assumes that a worker will be on the site for a total of 335 hours per year for a duration of 25 years. The indoor time is zero. The outdoor time fraction was determined by $335/8760 = 0.038$. The worker exposures are limited to working hours and do not include contributions from ingestion of drinking water, plant foods, meat or fish taken from the immediate area. The exposure pathways considered are summarized in Table 2.

Table 2. Summary of Pathways Considered

Pathway	Dose Calculation	Hot Spot Calculation
External exposure	Yes	Yes
Particulate inhalation	Yes	Yes
Radon inhalation	No	No
Ingestion of soil	Yes	Yes
Ingestion of produce from on-site garden	No	No
Ingestion of meat from on-site livestock	No	No
Ingestion of milk from on-site livestock	No	No
Ingestion of fish from on-site pond	No	No
Ingestion of water from on-site well	No	No

The RESRAD computer code, version 6.22, was used to calculate the dose/source concentration ratios $DSR_{ip}(t)$ for all identified radionuclides (i) and pathway (p) at time (t) after remediation. The period considered in this analysis was 1,000 years. Radioactive decay and ingrowth were considered in deriving the dose/source concentration ratios. The various parameters used in the RESRAD code for this analysis are listed in Appendix A. The calculated maximum dose contributions for all considered pathways are presented in Tables 3 and 4 and the dose/source concentration ratios summed over all pathways are presented in Table 5. The maximum dose contributions and total dose/source concentration ratios for CAS 10-09-02 are predicted to occur at time zero. The dose contributions are based on the average (mean plus the 95 percent confidence interval) radionuclide activity concentration and a 35 by 45-meter contamination area. The size of the area chosen for the dose calculation bounds the identified contamination area within this CAS (Figure 1). The data used to calculate the average dose scenario are provided as Exhibit 1.

Uncertainty in the derivation of dose contributions and dose/source concentration ratios comes from the distribution of possible input parameter values, as well as uncertainty in the conceptual model used to represent the site. The external exposure and particulate inhalation pathways contribute greater than 96 percent of the total dose. Therefore, uncertainties in the following parameters — occupancy factors, thickness of the contaminated zone, mass loading, and inhalation rate — have the greatest significance on the model predictions.

Figure 1

**CAU 357
Mud Pits and Waste Dump
CAS 10-09-02
Mud Pit U-10as**

Department of Energy - Nevada Test Site			
CAS 10-09-02 Mud Pit U-10as			
Contoured Radiological Survey Data			
Drawn	Checked	Approved	
A. Martinez	S. Alderson	S. Alderson	
Date	Date	Date	
4/09/04	12 / 22 / 2004	12 / 22 / 2004	
Plot no.	File		
DP04-090	Plot1.srf		
STOLLER-NAVARRO Radiation Services			

Average Background In Counts Per Second (CPS) 407
Confidence Level That Observed Count Rate Exceeds Background

68% 462 CPS
95.4% 497 CPS
99.7% 558 CPS
99.9% 578 CPS

Coordinates in UTM 11 North
NAD 1927 (WESTERN), meters

Table 3. Maximum Dose Contributions for CAS 10-09-02 (occurs at t = 0)

Radionuclide	Maximum Dose Contributions (mrem/yr)									
	Ground		Inhalation		Soil		Total		Fraction	Fraction
	mrem/yr	Fraction	mrem/yr	Fraction	mrem/yr	Fraction	mrem/yr	Fraction		
Americium-241	9.078E-03	0.0063	7.243E-02	0.0502	1.639E-02	0.0114	9.789E-02	0.0114	0.0679	0.0679
Cobalt-60	8.477E-02	0.0588	9.257E-07	0.0000	3.138E-06	0.0000	8.478E-02	0.0000	0.0588	0.0588
Cesium-137	1.065E+00	0.7386	8.116E-06	0.0000	3.511E-04	0.0002	1.065E+00	0.0002	0.7389	0.7389
Plutonium-238	1.170E-05	0.0000	2.269E-02	0.0157	5.113E-03	0.0035	2.782E-02	0.0035	0.0193	0.0193
Plutonium-239	1.055E-04	0.0001	1.199E-01	0.0832	2.731E-02	0.0189	1.473E-01	0.0189	0.1022	0.1022
Strontium-90	1.580E-03	0.0011	6.806E-05	0.0000	2.194E-04	0.0002	1.868E-03	0.0002	0.0013	0.0013
Uranium-234	1.570E-05	0.0000	4.018E-03	0.0028	2.378E-04	0.0002	4.271E-03	0.0002	0.0030	0.0030
Uranium-235	2.647E-03	0.0018	3.404E-04	0.0002	2.040E-05	0.0000	3.008E-03	0.0000	0.0021	0.0021
Uranium-238	5.748E-03	0.0040	3.592E-03	0.0025	2.260E-04	0.0002	9.566E-03	0.0002	0.0066	0.0066
Total	1.169E+00	0.8107	2.231E-01	0.1547	4.987E-02	0.0346	1.442E+00	0.0346	1.0000	1.0000

Table 4. Maximum Dose/Source Concentration Ratios Summed Over All Pathways

Summed Dose/Source Concentration Ratios (SDR) at Time t = 0.0 Years	
Radionuclide	SDR (mrem/yr)/(pCi/g)
Americium-241	1.659E-02
Cobalt-60	5.201E-01
Cesium-137	1.146E-01
Plutonium-238	1.325E-02
Plutonium-239	1.459E-02
Strontium-90	9.830E-04
Uranium-234	3.883E-03
Uranium-235	3.008E-02
Uranium-238	8.697E-03

RESRAD default parameters were used where site-specific data was not available. The default values are based on national averages or reasonable maximum values. The contaminated zone thickness of 1.1 meters with no cover was used to derive the dose contribution and is based on the results of the soil sampling. The calculated dose contributions and dose/source concentration ratios are conservative because in reality contamination is rarely distributed uniformly, but rather occurs in localized areas.

The residual radioactive material guideline represents the concentration of residual radioactive material that can remain in place and still allow use of that area without radiological restrictions. The radioactive material guideline, G, can be calculated given a dose limit of H_{EL} for an individual as follows:

$$G = H_{EL} / DSR$$

where DSR is the total dose/source concentration ratio listed in Table 4. The dose limit H_{EL} , used to derive the residual radioactive material guideline, is 25 mrem/yr. The calculated residual radioactive material guidelines for individual radionuclides are presented in Table 5.

Table 5. Residual Radioactive Material Guidelines for CAS 10-09-02

Radionuclide	Guideline (pCi/g)
Americium-241	1.507E+03
Cobalt-60	4.807E+01
Cesium-137	2.182E+02
Plutonium-238	1.887E+03
Plutonium-239	1.714E+03
Strontium-90	2.543E+04
Uranium-234	6.438E+03
Uranium-235	8.312E+02
Uranium-238	2.875E+03

The derived guidelines presented in Table 5 apply to a large, homogeneously contaminated area. For a small, isolated area of contamination (i.e., hot spots), the allowable concentration that can remain on site may be higher than what is allowed by the homogeneous area guideline due to the averaging process. To evaluate the potential for greater exposure to individuals using a site contaminated with hot spots versus a site that is homogeneously contaminated, the following hot spot criterion must be applied. The hot spot soil guideline G_i , can be calculated with RESRAD by using the area of the hot spot or can be conservatively estimated on a single radionuclide bases for field applications by using the following:

$$G_i = G_i(t_m) \times (100 / A)^{1/2}$$

where:

$G_i(t_m)$ = the single radionuclide soil guideline in a homogeneously contaminated zone
 A = area of hot spot (m^2).

The RESRAD code was used to calculate hot spot guideline values for the following hot spot areas: 100 m^2 , 10 m^2 , and 1 m^2 (Exhibits 2, 3, and 4). The initial radionuclide concentrations used were the maximum results and would represent the worst-case radionuclide ratio. The results for these calculations are presented in Table 6.

Table 6. Calculated Hot Spot Guidelines for CAS 10-09-02

Guidelines (pCi/g), by Size of Hot Spot			
Radionuclide	100 m²	10 m²	1 m²
Americium-241	2.328E+03	3.143E+03	4.384E+03
Cobalt-60	5.649E+01	1.032E+02	4.959E+02
Cesium-137	2.497E+02	4.480E+02	2.117E+03
Plutonium-238	3.013E+03	3.973E+03	5.138E+03
Plutonium-239	2.741E+03	3.615E+03	4.676E+03
Strontium-90	3.266E+04	5.898E+04	2.482E+05
Uranium-234	9.104E+03	1.179E+04	1.524E+04
Uranium-235	9.558E+02	1.592E+03	5.543E+03
Uranium-238	3.578E+03	5.625E+03	1.242E+04

The hot spot criteria can be used as long as the average radionuclide concentration for any 100 m² does not exceed the homogeneous residual radioactive material guidelines. A review of the radioanalytical data has identified that cobalt-60 is the most limiting radionuclide in the averaging calculation. Therefore, it is recommended that any hot spots be remediated to the 100-m² cobalt-60 guideline level for ALARA purposes.

The following graphs identify the dose contribution and excess cancer risk for each radionuclide summed across all pathways for this CAS. The EPA generally sets site-specific remediation levels for carcinogens at a level that represents an excess upper-bound lifetime cancer risk to an individual of between 1×10^{-4} to 1×10^{-6} . The “upper boundary of risk range is not a discrete line at 1×10^{-4} , although EPA generally uses 1×10^{-4} in making risk management decisions. A specific risk estimate around 10^{-4} may be considered acceptable if justified based on site-specific conditions.” (EPA, 1991).

Figures 2 and 3 represent the total dose rate per year and total excess cancer risk summed across all pathways for an individual under the scenario for this CAS. At time zero, the total dose rate per year to an individual on site is 1.4 mrem/year and the total excess cancer risk to the same individual is 2.3×10^{-5} . Therefore, no remediation is warranted under the CAS 10-09-02 scenario because the total dose rate and total excess cancer risk to an individual on site is well within the prescribed EPA guidance. However, the site may contain discrete areas of elevated radiological contamination; as a best management practice of ALARA these discrete areas of elevated radiological contamination should be remediated to the appropriate guideline levels in Table 6.

Figure 2 CAS 10-09-02: Dose Rate Per Year Summed Across All Pathways

DOSE: All Nuclides Summed, All Pathways Summed

CAU357-CAS 100902 Average Parcel.RAD 01/29/2005 13:17 Includes All Pathways

Figure 3 CAS 10-09-02: Excess Cancer Risk Per Year Summed Across All Pathways

CAU357-CAS 100902 Average Parcel.RAD 01/29/2005 13:17 Includes All Pathways

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Attachment A for CAS 10-09-02

Scenarios and Parameters Used for Analysis of CAS 10-09-02

The exposure scenario for CAS 10-09-02 addresses long-term exposure to workers exposed to residual levels of radionuclides in soil during an average workday outdoors onsite. This scenario used the following parameters:

Assumes a low occupancy activity at the site.

Workers will be on site 335 hours per year (335 site-hrs/yr) for 25 years.

The indoor time fraction is zero.

The outdoor time fraction is 0.038.

The worker exposures are limited to working hours and do not include contributions from ingestion of drinking water, plant foods, meat, or fish taken from the immediate area.

The parametric values used in the RESRAD code for the analysis of this site are listed in Table A.1. Some parameters are site specific, while other values are the default RESRAD values. The dose conversion factors used for inhalation and ingestion were the default FGR 11 values. The FRG 13 morbidity values were used for the risk slope factor and correspond to the guidance and recommendations per the memorandum from A. Lawrence, Office of Environmental Policy & Guidance, to Distribution, titled *Radiation Risk Estimation from Total Effective Dose Equivalents* (TEDEs) (EH-412-2002-1, August 9, 2002).

Table A.1 RESRAD Parameters Used for 25 mrem/yr Analysis of CAS 10-09-02

Parameter	Units	CAS 10-09-02	Hot Spot	Defaults	Reference/Rationale
R011 Contaminated Zone					
Area of Contaminated Zone	m ²	1.575E+03	100, 10, 1	1.000E+04	Area of contamination and hot spot area
Thickness of Contaminated Zone	m	1.100E+00	6.096E-01	2.000E+00	Based on sampling data
Length Parallel to Aquifer Flow	m	not used	not used	1.000E+02	
Radiation Dose Limit	mrem/yr	25	25	2.5E+001	
Elapsed Time Since Placement of Material	yr	0.0	0.0	0.0	
R012 Initial Principal Radionuclide					
Americium-241 (soil)	pCi/g	5.900E+00	7.130E+00	0.0	CAS 10-09-02 soil sampling results
Cobalt-60 (soil)	pCi/g	1.630E-01	1.630E-01	0.0	CAS 10-09-02 soil sampling results
Cesium-137 (soil)	pCi/g	9.300E+00	1.9400E+01	0.0	CAS 10-09-02 soil sampling results
Plutonium-238 (soil)	pCi/g	2.100E+00	4.010E+00	0.0	CAS 10-09-02 soil sampling results
Plutonium-239 (soil)	pCi/g	1.0105E+01	2.500E+01	0.0	CAS 10-09-02 soil sampling results
Strontium-90 (soil)	pCi/g	1.900E+00	2.250E+00	0.0	CAS 10-09-02 soil sampling results
Uranium-234 (soil)	pCi/g	1.100E+00	1.290E+00	0.0	CAS 10-09-02 soil sampling results
Uranium-235 (soil)	pCi/g	1.100E-01	1.270E-01	0.0	CAS 10-09-02 soil sampling results
Uranium-238 (soil)	pCi/g	1.100E+00	1.380E+00	0.0	CAS 10-09-02 soil sampling results

Table A.1 RESRAD Parameters Used for 25 mrem/yr Analysis of CAS 10-09-02 Cont.

Parameter	Units	CAS 10-09-02	Hot Spot	Defaults	Reference/Rationale
R013 Cover and Contaminated Zone Hydrological Data					
Cover Depth	m	0.0	0.0	0.0	No Cover Assumed
Density of Cover Material	g/cm ³	not used	not used	1.5	No Cover Assumed
Cover Depth Erosion Rate	m/yr	not used	not used	1.000E-03	No Cover Assumed
Density of Contaminated Zone	g/cm ³	1.5	1.5	1.5	
Contamination Zone Erosion Rate	m/yr	1.000E-03	1.000E-03	1.000E-03	
Contaminated Zone Total Porosity	-	4.000E-01	4.000E-01	4.000E-01	
Contaminated Zone Field Capacity	-	2.000E-01	2.000E-01	2.000E-01	
Contaminated Zone Hydraulic Conductivity	m/yr	1.000E+01	1.000E+01	1.000E+01	
Contaminated Zone b Parameter	-	5.300E+00	5.300E+00	5.300E+00	
Average Annual Wind Speed	m/sec	3.5	3.5	2.000E+00	Data from Air Resource Laboratory
Humidity in Air	g/m ³	not used	not used	8.000E+00	
Evapotranspiration Coefficient	-	5.000E-01	5.000E-01	5.000E-01	
Precipitation	m/yr	3.000E+-2	3.000E+-2	1.000E+00	Data from Air Resources Laboratory
Irrigation	m/yr	2.000E-01	2.000E-01	2.000E-01	
Irrigation Mode	-	overhead	overhead	overhead	
Runoff Coefficient	-	4.000E-01	4.000E-01	2.000E-01	
Watershed Area for Nearby Stream or Pond	m ²	not used	not used	1.000E+06	
Accuracy for Water/Soil Computations	-	not used	not used	1.000E-03	

Table A.1 RESRAD Parameters Used for 25 mrem/yr Analysis of CAS 10-09-02 Cont.

Parameter	Units	CAS 10-09-02	Hot Spot	Defaults	Reference/Rationale
R014 Saturated Zone Hydrological Data					
Density of Saturated Zone	g/cm ³	not used	not used	1.500E+00	
Saturated Zone Total Porosity	-	not used	not used	4.000E-01	
Saturated Zone Effective Porosity	-	not used	not used	2.000E-01	
Saturated Zone Field Capacity	-	not used	not used	2.000E-01	
Saturated Zone Hydraulic Conductivity	m/yr	not used	not used	1.000E+02	
Saturated Zone Hydraulic Gradient	-	not used	not used	2.000E-02	
Saturated Zone b Parameter	-	not used	not used	5.300E+00	
Water Table Drop Rate	m/yr	not used	not used	1.000E-03	
Well Pump Intake Depth	m	not used	not used	1.000E+01	
Model: Nondispersion or Mass-Balance	-	not used	not used	ND	
Well Pumping Rate	m ³ /yr	not used	not used	2.500E+02	
R015 Uncontaminated and Unsaturated Strata Hydrological Data					
Number of Unsaturated Zone Strata	-	not used	not used	1	
Thickness	m	not used	not used	4.000E+00	
Soil Density	g/cm ³	not used	not used	1.500E+00	
Total Porosity	-	not used	not used	4.000E-01	
Effective Porosity	-	not used	not used	2.000E-01	
Field Capacity	-	not used	not used	2.000E-01	
Soil-specific b Parameter	-	not used	not used	5.300E+00	
Hydraulic Conductivity	m/yr	not used	not used	1.000E+01	

Table A.1 RESRAD Parameters Used for 25 mrem/yr Analysis of CAS 10-09-02 Cont.

Parameter	Units	CAS 10-09-02	Hot Spot	Defaults	Reference/Rationale
R016 Distribution Coefficients and Leach Rates					
Contaminated Zone K_d (all Zones)	cm ³ /g				
Americium Radionuclides		2.000E+01	2.000E+01	2.000E+01	Default or a lower value given in RESRAD
Cobalt Radionuclides		1.000E+03	1.000E+03	1.000E+03	
Cesium Radionuclides		1.700E+02	1.700E+02	1.000E+03	
Plutonium Radionuclides		2.000E+03	2.000E+03	2.000E+03	
Strontium Radionuclides		3.000E+01	3.000E+01	3.000E+01	
Uranium Radionuclides		3.500E+01	3.500E+01	5.000E+01	
Saturated Leach Rate	/yr	0.0	0.0	0.0	
Solubility Constant	-	0.0	0.0	0.0	
R017 Inhalation and External Gamma					
Inhalation Rate	m ³ /yr	1.230E+04	1.230E+04	8.400E+03	
Mass Loading for Inhalation	g/m ³	6.000E-04	6.000E-04	1E-04	
Exposure Duration	yr	25	25	30	Estimated
Shielding Factor Inhalation	-	1	1	0.4	
Shielding Factor External Gamma	-	1	1	0.7	
Fraction of Time Spent Indoors	-	0.0	0.0	0.5	Estimated
Fraction of Time Spent Outdoors	-	0.038	0.038	0.25	Estimated
Shape Factor	-	1.0	1.0	1.0	
R018 Ingestion Pathway Data, Dietary Parameters					
Fruits, Vegetables, and Grain Consumption	kg/yr	not used	not used	1.600E+02	
Leafy Vegetable Consumption	kg/yr	not used	not used	1.400E+01	
Milk Consumption	L/yr	not used	not used	9.200E+01	
Meat and Poultry Consumption	kg/yr	not used	not used	6.300E+01	

Table A.1 RESRAD Parameters Used for 25 mrem/yr Analysis of CAS 10-09-02 Cont.

Parameter	Units	CAS 10-09-02	Hot Spot	Defaults	Reference/Rationale
Fish Consumption	kg/yr	not used	not used	5.400E+00	
Other Seafood Consumption	kg/yr	not used	not used	9.000E-01	
Soil Ingestion Rate	g/yr	20.1	20.1	36.5	EPA 1991, 480 mg/day
Drinking Water Intake	L/yr	not used	not used	5.100E+02	
Drinking Water Contaminated Fraction	-	not used	not used	1.000E+00	
Household Water Contaminated Fraction	-	not used	not used	1.000E+00	
Livestock Water Contaminated Fraction	-	not used	not used	1.000E+00	
Irrigation Water Contaminated Fraction	-	not used	not used	1.000E+00	
Aquatic Food Contamination Fraction	-	not used	not used	5.000E-01	
Plant Food Contamination Fraction	-	not used	not used	-1	
Meat Contamination Fraction	-	not used	not used	-1	
Milk Contamination Fraction	-	not used	not used	-1	
R019 Ingestion Pathway Data, Nondietary					
Livestock Fodder Intake for Meat	kg/day	not used	not used	6.800E+01	
Livestock Fodder Intake for Milk	kg/day	not used	not used	5.500E+01	
Livestock Water Intake for Meat	L/day	not used	not used	5.000E+01	
Livestock Water Intake for Milk	L/day	not used	not used	1.600E+02	
Livestock Soil Intake	kg/day	not used	not used	5.000E-01	
Mass Loading for Foliar Deposition	g/m ³	not used	not used	1.000E-04	
Depth of Soil Mixing layer	m	1.500E-01	1.500E-01	1.500E-01	
Depth of Roots	m	not used	not used	9.000E-01	

Table A.1 RESRAD Parameters Used for 25 mrem/yr Analysis of CAS 10-09-02 Cont.

Parameter	Units	CAS 10-09-02	Hot Spot	Defaults	Reference/Rationale
Drinking Water Fraction from Groundwater	-	not used	not used	1.000E+00	
Household Water Fraction from Groundwater	-	not used	not used	1.000E+00	
Livestock Water Fraction from Groundwater	-	not used	not used	1.000E+00	
Irrigation Fraction from Groundwater	-	not used	not used	1.000E+00	
R021 Radon					
Radon Parameters Not Used					

Exhibit 1

RESRAD Scenario CAS 10-09-02 Average Dose

(27 Pages)

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines
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Dose Conversion Factor (and Related) Parameter Summary ...	2
Site-Specific Parameter Summary	6
Summary of Pathway Selections	12
Contaminated Zone and Total Dose Summary	13
Total Dose Components	
Time = 0.000E+00	14
Time = 1.000E+00	15
Time = 3.000E+00	16
Time = 1.000E+01	17
Time = 3.000E+01	18
Time = 1.000E+02	19
Time = 3.000E+02	20
Time = 1.000E+03	21
Dose/Source Ratios Summed Over All Pathways	22
Single Radionuclide Soil Guidelines	23
Dose Per Nuclide Summed Over All Pathways	24
Soil Concentration Per Nuclide	26

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

0	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	Am-241		4.440E-01	4.440E-01	DCF2 (2)
B-1	Co-60		2.190E-04	2.190E-04	DCF2 (3)
B-1	Cs-137+D		3.190E-05	3.190E-05	DCF2 (4)
B-1	Np-237+D		5.400E-01	5.400E-01	DCF2 (5)
B-1	Pa-231		1.280E+00	1.280E+00	DCF2 (6)
B-1	Pb-210+D		1.380E-02	1.380E-02	DCF2 (7)
B-1	Po-210		9.400E-03	9.400E-03	DCF2 (8)
B-1	Pu-238		3.920E-01	3.920E-01	DCF2 (9)
B-1	Pu-239		4.290E-01	4.290E-01	DCF2 (10)
B-1	Ra-226+D		8.600E-03	8.600E-03	DCF2 (11)
B-1	Sr-90+D		1.310E-03	1.310E-03	DCF2 (12)
B-1	Th-229+D		2.160E+00	2.160E+00	DCF2 (13)
B-1	Th-230		3.260E-01	3.260E-01	DCF2 (14)
B-1	U-233		1.350E-01	1.350E-01	DCF2 (15)
B-1	U-234		1.320E-01	1.320E-01	DCF2 (16)
B-1	U-235+D		1.230E-01	1.230E-01	DCF2 (17)
B-1	U-238+D		1.180E-01	1.180E-01	DCF2 (18)
D-1		Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D		1.480E-02	1.480E-02	DCF3 (1)
D-1	Am-241		3.640E-03	3.640E-03	DCF3 (2)
D-1	Co-60		2.690E-05	2.690E-05	DCF3 (3)
D-1	Cs-137+D		5.000E-05	5.000E-05	DCF3 (4)
D-1	Np-237+D		4.440E-03	4.440E-03	DCF3 (5)
D-1	Pa-231		1.060E-02	1.060E-02	DCF3 (6)
D-1	Pb-210+D		5.370E-03	5.370E-03	DCF3 (7)
D-1	Po-210		1.900E-03	1.900E-03	DCF3 (8)
D-1	Pu-238		3.200E-03	3.200E-03	DCF3 (9)
D-1	Pu-239		3.540E-03	3.540E-03	DCF3 (10)
D-1	Ra-226+D		1.330E-03	1.330E-03	DCF3 (11)
D-1	Sr-90+D		1.530E-04	1.530E-04	DCF3 (12)
D-1	Th-229+D		4.030E-03	4.030E-03	DCF3 (13)
D-1	Th-230		5.480E-04	5.480E-04	DCF3 (14)
D-1	U-233		2.890E-04	2.890E-04	DCF3 (15)
D-1	U-234		2.830E-04	2.830E-04	DCF3 (16)
D-1	U-235+D		2.670E-04	2.670E-04	DCF3 (17)
D-1	U-238+D		2.690E-04	2.690E-04	DCF3 (18)
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	Am-241 , plant/soil concentration ratio, dimensionless		1.000E-03	1.000E-03	RTF (2,1)
D-34	Am-241 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		5.000E-05	5.000E-05	RTF (2,2)
D-34	Am-241 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)		2.000E-06	2.000E-06	RTF (2,3)
D-34					

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

0	Menu	Parameter	Current Value	Default	Parameter Name
D-34	Co-60	, plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF (3,1)
D-34	Co-60	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF (3,2)
D-34	Co-60	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF (3,3)
D-34					
D-34	Cs-137+D	, plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF (4,1)
D-34	Cs-137+D	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF (4,2)
D-34	Cs-137+D	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF (4,3)
D-34					
D-34	Np-237+D	, plant/soil concentration ratio, dimensionless	2.000E-02	2.000E-02	RTF (5,1)
D-34	Np-237+D	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF (5,2)
D-34	Np-237+D	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF (5,3)
D-34					
D-34	Pa-231	, plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF (6,1)
D-34	Pa-231	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF (6,2)
D-34	Pa-231	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF (6,3)
D-34					
D-34	Pb-210+D	, plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF (7,1)
D-34	Pb-210+D	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF (7,2)
D-34	Pb-210+D	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF (7,3)
D-34					
D-34	Po-210	, plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (8,1)
D-34	Po-210	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF (8,2)
D-34	Po-210	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.400E-04	3.400E-04	RTF (8,3)
D-34					
D-34	Pu-238	, plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (9,1)
D-34	Pu-238	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF (9,2)
D-34	Pu-238	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF (9,3)
D-34					
D-34	Pu-239	, plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (10,1)
D-34	Pu-239	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF (10,2)
D-34	Pu-239	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF (10,3)
D-34					
D-34	Ra-226+D	, plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF (11,1)
D-34	Ra-226+D	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF (11,2)
D-34	Ra-226+D	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF (11,3)
D-34					
D-34	Sr-90+D	, plant/soil concentration ratio, dimensionless	3.000E-01	3.000E-01	RTF (12,1)
D-34	Sr-90+D	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-03	8.000E-03	RTF (12,2)
D-34	Sr-90+D	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF (12,3)
D-34					
D-34	Th-229+D	, plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (13,1)
D-34	Th-229+D	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF (13,2)
D-34	Th-229+D	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF (13,3)
D-34					
D-34	Th-230	, plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (14,1)
D-34	Th-230	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF (14,2)
D-34	Th-230	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF (14,3)
D-34					

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

File: FGR 13 Morbidity

0	Menu	Parameter	Current Value	Default	Parameter Name
D-34	U-233	, plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(15,1)
D-34	U-233	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(15,2)
D-34	U-233	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(15,3)
D-34					
D-34	U-234	, plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(16,1)
D-34	U-234	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(16,2)
D-34	U-234	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(16,3)
D-34					
D-34	U-235+D	, plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(17,1)
D-34	U-235+D	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(17,2)
D-34	U-235+D	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(17,3)
D-34					
D-34	U-238+D	, plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(18,1)
D-34	U-238+D	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(18,2)
D-34	U-238+D	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(18,3)
D-5					
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	Am-241	, fish	3.000E+01	3.000E+01	BIOFAC(2,1)
D-5	Am-241	, crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(2,2)
D-5					
D-5	Co-60	, fish	3.000E+02	3.000E+02	BIOFAC(3,1)
D-5	Co-60	, crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(3,2)
D-5					
D-5	Cs-137+D	, fish	2.000E+03	2.000E+03	BIOFAC(4,1)
D-5	Cs-137+D	, crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(4,2)
D-5					
D-5	Np-237+D	, fish	3.000E+01	3.000E+01	BIOFAC(5,1)
D-5	Np-237+D	, crustacea and mollusks	4.000E+02	4.000E+02	BIOFAC(5,2)
D-5					
D-5	Pa-231	, fish	1.000E+01	1.000E+01	BIOFAC(6,1)
D-5	Pa-231	, crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(6,2)
D-5					
D-5	Pb-210+D	, fish	3.000E+02	3.000E+02	BIOFAC(7,1)
D-5	Pb-210+D	, crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(7,2)
D-5					
D-5	Po-210	, fish	1.000E+02	1.000E+02	BIOFAC(8,1)
D-5	Po-210	, crustacea and mollusks	2.000E+04	2.000E+04	BIOFAC(8,2)
D-5					
D-5	Pu-238	, fish	3.000E+01	3.000E+01	BIOFAC(9,1)
D-5	Pu-238	, crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(9,2)
D-5					
D-5	Pu-239	, fish	3.000E+01	3.000E+01	BIOFAC(10,1)
D-5	Pu-239	, crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(10,2)
D-5					
D-5	Ra-226+D	, fish	5.000E+01	5.000E+01	BIOFAC(11,1)
D-5	Ra-226+D	, crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(11,2)
D-5					

Site-Specific Parameter Summary						
	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
0						
R011	Area of contaminated zone (m**2)	1.575E+03	1.000E+04		---	AREA
R011	Thickness of contaminated zone (m)	1.100E+00	2.000E+00		---	THICKO
R011	Length parallel to aquifer flow (m)	not used	1.000E+02		---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	2.500E+01		---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00		---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00		---	T (2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00		---	T (3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01		---	T (4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01		---	T (5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02		---	T (6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02		---	T (7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03		---	T (8)
R011	Times for calculations (yr)	not used	0.000E+00		---	T (9)
R011	Times for calculations (yr)	not used	0.000E+00		---	T (10)
R012	Initial principal radionuclide (pCi/g): Am-241	5.900E+00	0.000E+00		---	S1 (2)
R012	Initial principal radionuclide (pCi/g): Co-60	1.630E-01	0.000E+00		---	S1 (3)
R012	Initial principal radionuclide (pCi/g): Cs-137	9.300E+00	0.000E+00		---	S1 (4)
R012	Initial principal radionuclide (pCi/g): Pu-238	2.100E+00	0.000E+00		---	S1 (9)
R012	Initial principal radionuclide (pCi/g): Pu-239	1.010E+01	0.000E+00		---	S1 (10)
R012	Initial principal radionuclide (pCi/g): Sr-90	1.900E+00	0.000E+00		---	S1 (12)
R012	Initial principal radionuclide (pCi/g): U-234	1.100E+00	0.000E+00		---	S1 (16)
R012	Initial principal radionuclide (pCi/g): U-235	1.000E-01	0.000E+00		---	S1 (17)
R012	Initial principal radionuclide (pCi/g): U-238	1.100E+00	0.000E+00		---	S1 (18)
R012	Concentration in groundwater (pCi/L): Am-241	not used	0.000E+00		---	W1 (2)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00		---	W1 (3)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00		---	W1 (4)
R012	Concentration in groundwater (pCi/L): Pu-238	not used	0.000E+00		---	W1 (9)
R012	Concentration in groundwater (pCi/L): Pu-239	not used	0.000E+00		---	W1 (10)
R012	Concentration in groundwater (pCi/L): Sr-90	not used	0.000E+00		---	W1 (12)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00		---	W1 (16)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00		---	W1 (17)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00		---	W1 (18)
R013	Cover depth (m)	0.000E+00	0.000E+00		---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00		---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03		---	VCV
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00		---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03		---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01		---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01		---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01		---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00		---	BCZ
R013	Average annual wind speed (m/sec)	3.500E+00	2.000E+00		---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00		---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01		---	EVAPTR
R013	Precipitation (m/yr)	3.000E-02	1.000E+00		---	PRECIP
R013	Irrigation (m/yr)	0.000E+00	2.000E-01		---	RI
R013	Irrigation mode	overhead	overhead		---	IDITCH
R013	Runoff coefficient	4.000E-01	2.000E-01		---	RUNOFF

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
0						
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
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00		---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00		---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01		---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01		---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01		---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00		---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01		---	HCUZ(1)
R016	Distribution coefficients for Am-241					
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01		---	DCNUCC(2)
R016	Unsat. zone 1 (cm**3/g)	not used	2.000E+01		---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+01		---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		2.706E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(2)
R016	Distribution coefficients for Co-60					
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03		---	DCNUCC(3)
R016	Unsat. zone 1 (cm**3/g)	not used	1.000E+03		---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+03		---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		5.454E-06	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(3)
R016	Distribution coefficients for Cs-137					
R016	Contaminated zone (cm**3/g)	1.700E+02	1.000E+03		---	DCNUCC(4)
R016	Unsat. zone 1 (cm**3/g)	not used	1.000E+03		---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+03		---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		3.206E-05	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(4)
R016	Distribution coefficients for Pu-238					
R016	Contaminated zone (cm**3/g)	2.000E+03	2.000E+03		---	DCNUCC(9)
R016	Unsat. zone 1 (cm**3/g)	not used	2.000E+03		---	DCNUCU(9,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+03		---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		2.727E-06	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(9)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
0					
R016	Distribution coefficients for Pu-239				
R016	Contaminated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCC (10)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+03	---	DCNUCU (10,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+03	---	DCNUCS (10)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.727E-06	ALEACH (10)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK (10)
R016	Distribution coefficients for Sr-90				
R016	Contaminated zone (cm**3/g)	3.000E+01	3.000E+01	---	DCNUCC (12)
R016	Unsaturated zone 1 (cm**3/g)	not used	3.000E+01	---	DCNUCU (12,1)
R016	Saturated zone (cm**3/g)	not used	3.000E+01	---	DCNUCS (12)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.809E-04	ALEACH (12)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK (12)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	3.500E+01	5.000E+01	---	DCNUCC (16)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU (16,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS (16)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.551E-04	ALEACH (16)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK (16)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	3.500E+01	5.000E+01	---	DCNUCC (17)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU (17,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS (17)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.551E-04	ALEACH (17)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK (17)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	3.500E+01	5.000E+01	---	DCNUCC (18)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU (18,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS (18)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.551E-04	ALEACH (18)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK (18)
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC (1)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+01	---	DCNUCU (1,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+01	---	DCNUCS (1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.706E-04	ALEACH (1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK (1)
R016	Distribution coefficients for daughter Np-237				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.574E+02	DCNUCC (5)
R016	Unsaturated zone 1 (cm**3/g)	not used	-1.000E+00	---	DCNUCU (5,1)
R016	Saturated zone (cm**3/g)	not used	-1.000E+00	---	DCNUCS (5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.118E-05	ALEACH (5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK (5)

Site-Specific Parameter Summary (continued)						
Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
R016	Distribution coefficients for daughter Pa-231					
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01		---	DCNUCC (6)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (6,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		1.087E-04	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)	1.000E+02	1.000E+02		---	DCNUCC (7)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+02		---	DCNUCU (7,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+02		---	DCNUCS (7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		5.446E-05	ALEACH (7)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (7)
R016	Distribution coefficients for daughter Po-210					
R016	Contaminated zone (cm**3/g)	1.000E+01	1.000E+01		---	DCNUCC (8)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+01		---	DCNUCU (8,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+01		---	DCNUCS (8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		5.369E-04	ALEACH (8)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (8)
R016	Distribution coefficients for daughter Ra-226					
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01		---	DCNUCC (11)
R016	Unsaturated zone 1 (cm**3/g)	not used	7.000E+01		---	DCNUCU (11,1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01		---	DCNUCS (11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		7.775E-05	ALEACH (11)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (11)
R016	Distribution coefficients for daughter Th-229					
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04		---	DCNUCC (13)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04		---	DCNUCU (13,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04		---	DCNUCS (13)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		9.091E-08	ALEACH (13)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (13)
R016	Distribution coefficients for daughter Th-230					
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04		---	DCNUCC (14)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04		---	DCNUCU (14,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04		---	DCNUCS (14)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		9.091E-08	ALEACH (14)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (14)
R016	Distribution coefficients for daughter U-233					
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01		---	DCNUCC (15)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (15,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (15)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		1.087E-04	ALEACH (15)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (15)
R017	Inhalation rate (m**3/yr)	1.230E+04	8.400E+03		---	INHALR

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
0					
R017	Mass loading for inhalation (g/m**3)	6.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	2.500E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	1.000E+00	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	1.000E+00	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	3.800E-02	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)	2.010E+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

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LF15
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LF16
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	---	RDY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDY(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
C14	DCF correction factor for gaseous forms of C14	not used	8.894E+01	---	CO2F
STOR	Storage times of contaminated foodstuffs (days) :				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
0					
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T (7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T (8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T (9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSEFL
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	---	HMX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA (1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA (2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	1	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	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	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	1575.00 square meters	Am-241	5.900E+00
Thickness:	1.10 meters	Co-60	1.630E-01
Cover Depth:	0.00 meters	Cs-137	9.300E+00
		Pu-238	2.100E+00
		Pu-239	1.010E+01
		Sr-90	1.900E+00
		U-234	1.100E+00
		U-235	1.000E-01
		U-238	1.100E+00

0

Total Dose TDose(t), mrem/yr	
Basic Radiation Dose Limit = 2.500E+01 mrem/yr	
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)	
t (years):	0.000E+00 1.000E+00 3.000E+00 1.000E+01 3.000E+01 1.000E+02 3.000E+02 1.000E+03
TDose(t):	1.442E+00 1.407E+00 1.341E+00 1.155E+00 8.132E-01 3.629E-01 2.218E-01 1.171E-01
M(t):	5.768E-02 5.627E-02 5.366E-02 4.622E-02 3.253E-02 1.451E-02 8.871E-03 4.682E-03
OMaximum TDose(t): 1.442E+00 mrem/yr at t = 0.000E+00 years	

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

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	9.078E-03	0.0063	7.243E-02	0.0502	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.639E-02	0.0114
Co-60	8.477E-02	0.0588	9.257E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.138E-06	0.0000
Cs-137	1.065E+00	0.7386	8.116E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.511E-04	0.0002
Pu-238	1.170E-05	0.0000	2.269E-02	0.0157	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.113E-03	0.0035
Pu-239	1.055E-04	0.0001	1.199E-01	0.0832	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.731E-02	0.0189
Sr-90	1.580E-03	0.0011	6.806E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.194E-04	0.0002
U-234	1.570E-05	0.0000	4.018E-03	0.0028	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.378E-04	0.0002
U-235	2.647E-03	0.0018	3.404E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.040E-05	0.0000
U-238	5.748E-03	0.0040	3.592E-03	0.0025	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.260E-04	0.0002
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	1.169E+00	0.8107	2.231E-01	0.1547	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.987E-02	0.0346

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.789E-02	0.0679
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.478E-02	0.0588
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.065E+00	0.7389
Pu-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	2.782E-02	0.0193
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.473E-01	0.1022
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.868E-03	0.0013
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	4.271E-03	0.0030
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	3.008E-03	0.0021
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	9.566E-03	0.0066
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	1.442E+00	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+00 Years

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	9.061E-03	0.0064	7.229E-02	0.0514	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.636E-02	0.0116
Co-60	7.433E-02	0.0528	8.116E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.751E-06	0.0000
Cs-137	1.041E+00	0.7398	7.930E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.431E-04	0.0002
Pu-238	1.161E-05	0.0000	2.251E-02	0.0160	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.072E-03	0.0036
Pu-239	1.055E-04	0.0001	1.199E-01	0.0852	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.731E-02	0.0194
Sr-90	1.543E-03	0.0011	6.645E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.142E-04	0.0002
U-234	1.570E-05	0.0000	4.017E-03	0.0029	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.377E-04	0.0002
U-235	2.647E-03	0.0019	3.404E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.042E-05	0.0000
U-238	5.748E-03	0.0041	3.591E-03	0.0026	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.260E-04	0.0002
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	1.134E+00	0.8063	2.227E-01	0.1583	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.978E-02	0.0354

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

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.771E-02	0.0695
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.433E-02	0.0528
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.041E+00	0.7401
Pu-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	2.760E-02	0.0196
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.473E-01	0.1047
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.823E-03	0.0013
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	4.271E-03	0.0030
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	3.007E-03	0.0021
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	9.565E-03	0.0068
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	1.407E+00	1.0000

0*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 Years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	9.028E-03	0.0067	7.202E-02	0.0537	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.630E-02	0.0121
Co-60	5.714E-02	0.0426	6.239E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.115E-06	0.0000
Cs-137	9.936E-01	0.7407	7.572E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.275E-04	0.0002
Pu-238	1.143E-05	0.0000	2.216E-02	0.0165	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.993E-03	0.0037
Pu-239	1.055E-04	0.0001	1.199E-01	0.0894	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.731E-02	0.0204
Sr-90	1.471E-03	0.0011	6.334E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.042E-04	0.0002
U-234	1.571E-05	0.0000	4.016E-03	0.0030	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.377E-04	0.0002
U-235	2.646E-03	0.0020	3.405E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.045E-05	0.0000
U-238	5.746E-03	0.0043	3.590E-03	0.0027	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.259E-04	0.0002
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	1.070E+00	0.7975	2.221E-01	0.1656	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.961E-02	0.0370

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.735E-02	0.0726
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.714E-02	0.0426
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.939E-01	0.7409
Pu-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	2.716E-02	0.0202
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.473E-01	0.1098
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.738E-03	0.0013
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	4.270E-03	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	3.007E-03	0.0022
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	9.562E-03	0.0071
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	1.341E+00	1.0000

0*Sum of all water independent and dependent pathways.

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

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

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	8.911E-03	0.0077	7.108E-02	0.0615	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.608E-02	0.0139
Co-60	2.276E-02	0.0197	2.485E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.425E-07	0.0000
Cs-137	8.450E-01	0.7314	6.439E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.786E-04	0.0002
Pu-238	1.082E-05	0.0000	2.097E-02	0.0181	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.724E-03	0.0041
Pu-239	1.055E-04	0.0001	1.199E-01	0.1037	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.730E-02	0.0236
Sr-90	1.243E-03	0.0011	5.355E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.726E-04	0.0001
U-234	1.577E-05	0.0000	4.013E-03	0.0035	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.374E-04	0.0002
U-235	2.643E-03	0.0023	3.412E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.058E-05	0.0000
U-238	5.740E-03	0.0050	3.586E-03	0.0031	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.256E-04	0.0002
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	8.865E-01	0.7672	2.199E-01	0.1903	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.904E-02	0.0424

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.608E-02	0.0832
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.276E-02	0.0197
Cs-137	0.000E+00	0.0000	0.000E+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-01	0.7316
Pu-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	2.570E-02	0.0222
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.473E-01	0.1275
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.469E-03	0.0013
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	4.266E-03	0.0037
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	3.005E-03	0.0026
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	9.552E-03	0.0083
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+01 Years

Radio- Nuclide	Ground			Inhalation			Radon			Plant			Meat			Milk			Soil		
	mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.	
Am-241	8.585E-03	0.0106		6.847E-02	0.0842		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		1.549E-02	0.0191	
Co-60	1.640E-03	0.0020		1.791E-08	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		6.071E-08	0.0000	
Cs-137	5.320E-01	0.6542		4.054E-06	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		1.754E-04	0.0002	
Pu-238	9.236E-06	0.0000		1.790E-02	0.0220		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		4.033E-03	0.0050	
Pu-239	1.054E-04	0.0001		1.198E-01	0.1473		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		2.728E-02	0.0336	
Sr-90	7.696E-04	0.0009		3.315E-05	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		1.068E-04	0.0001	
U-234	1.640E-05	0.0000		4.002E-03	0.0049		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		2.368E-04	0.0003	
U-235	2.637E-03	0.0032		3.454E-04	0.0004		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		2.108E-05	0.0000	
U-238	5.722E-03	0.0070		3.575E-03	0.0044		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		2.250E-04	0.0003	
=====	=====	=====		=====	=====		=====	=====		=====	=====		=====	=====		=====	=====		=====	=====	
Total	5.515E-01	0.6782		2.141E-01	0.2633		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		4.757E-02	0.0585	

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

Radio- Nuclide	Water			Fish			Radon			Plant			Meat			Milk			All Pathways*		
	mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.	
Am-241	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		9.255E-02	0.1138	
Co-60	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		1.640E-03	0.0020	
Cs-137	0.000E+00	0.0000		0.000E+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-01	0.6544	
Pu-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		2.195E-02	0.0270	
Pu-239	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		1.472E-01	0.1810	
Sr-90	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		9.096E-04	0.0011	
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		4.255E-03	0.0052	
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		3.003E-03	0.0037	
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		9.522E-03	0.0117	
=====	=====	=====		=====	=====		=====	=====		=====	=====		=====	=====		=====	=====		=====	=====	
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		8.132E-01	1.0000	

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 Years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	7.536E-03	0.0208	6.007E-02	0.1655	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.359E-02	0.0375
Co-60	1.648E-07	0.0000	1.800E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.101E-12	0.0000
Cs-137	1.053E-01	0.2903	8.026E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.472E-05	0.0001
Pu-238	5.318E-06	0.0000	1.030E-02	0.0284	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.320E-03	0.0064
Pu-239	1.052E-04	0.0003	1.195E-01	0.3294	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.722E-02	0.0750
Sr-90	1.436E-04	0.0004	6.184E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.993E-05	0.0001
U-234	2.365E-05	0.0001	3.964E-03	0.0109	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.345E-04	0.0006
U-235	2.618E-03	0.0072	3.698E-04	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.343E-05	0.0001
U-238	5.660E-03	0.0156	3.538E-03	0.0097	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.226E-04	0.0006
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	1.214E-01	0.3346	1.978E-01	0.5450	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.367E-02	0.1203

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.120E-02	0.2238
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.648E-07	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.054E-01	0.2904
Pu-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	1.262E-02	0.0348
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.469E-01	0.4047
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.697E-04	0.0005
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	4.222E-03	0.0116
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	3.011E-03	0.0083
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	9.420E-03	0.0260
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	3.629E-01	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 Years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground			Inhalation			Radon			Plant			Meat			Milk			Soil		
	mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.	
Am-241	5.195E-03	0.0234		4.132E-02	0.1863		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		9.349E-03	0.0422	
Co-60	6.228E-19	0.0000		6.801E-24	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		2.306E-23	0.0000	
Cs-137	1.030E-03	0.0046		7.850E-09	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		3.396E-07	0.0000	
Pu-238	1.126E-06	0.0000		2.122E-03	0.0096		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		4.777E-04	0.0022	
Pu-239	1.046E-04	0.0005		1.188E-01	0.5356		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		2.705E-02	0.1220	
Sr-90	1.185E-06	0.0000		5.106E-08	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		1.646E-07	0.0000	
U-234	8.476E-05	0.0004		3.858E-03	0.0174		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		2.290E-04	0.0010	
U-235	2.568E-03	0.0116		4.475E-04	0.0020		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		3.054E-05	0.0001	
U-238	5.487E-03	0.0247		3.432E-03	0.0155		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		2.159E-04	0.0010	
=====	=====	=====		=====	=====		=====	=====		=====	=====		=====	=====		=====	=====		=====	=====	
Total	1.447E-02	0.0653		1.700E-01	0.7663		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		3.735E-02	0.1684	

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- Nuclide	Water			Fish			Radon			Plant			Meat			Milk			All Pathways*		
	mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.	
Am-241	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		5.586E-02	0.2519	
Co-60	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		6.228E-19	0.0000	
Cs-137	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		1.030E-03	0.0046	
Pu-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		2.601E-03	0.0117	
Pu-239	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		1.459E-01	0.6580	
Sr-90	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		1.401E-06	0.0000	
U-234	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		4.172E-03	0.0188	
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		3.046E-03	0.0137	
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		9.135E-03	0.0412	
=====	=====	=====		=====	=====		=====	=====		=====	=====		=====	=====		=====	=====		=====	=====	
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		2.218E-01	1.0000	

0*Sum of all water independent and dependent pathways.

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

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.441E-03	0.0123	7.403E-03	0.0632	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.675E-03	0.0143
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	7.733E-11	0.0000	4.817E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.084E-14	0.0000
Pu-238	2.861E-07	0.0000	7.188E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.353E-06	0.0000
Pu-239	9.384E-05	0.0008	7.707E-02	0.6584	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.755E-02	0.1499
Sr-90	5.337E-14	0.0000	1.732E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.583E-15	0.0000
U-234	5.136E-04	0.0044	2.331E-03	0.0199	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.443E-04	0.0012
U-235	2.174E-03	0.0186	4.549E-04	0.0039	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.472E-05	0.0003
U-238	3.989E-03	0.0341	2.047E-03	0.0175	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.288E-04	0.0011
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	8.213E-03	0.0702	8.931E-02	0.7630	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.954E-02	0.1669

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.052E-02	0.0899
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.735E-11	0.0000
Pu-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	8.828E-06	0.0001
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.472E-02	0.8091
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.069E-14	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.989E-03	0.0255
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	2.664E-03	0.0228
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	6.165E-03	0.0527
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	1.171E-01	1.0000

0*Sum of all water independent and dependent pathways.

		Dose/Source Ratios Summed Over All Pathways									
		Parent and Progeny Principal Radionuclide Contributions Indicated									
0Parent	Product	Branch	Fraction*	t=	1.000E+00	1.000E+00	3.000E+00	DSR(j,t)	(mrem/yr)	(pCi/g)	
(i)	(j)										
Am-241	Am-241	1.000E+00	1.659E-02	1.656E-02	1.650E-02	1.628E-02	1.569E-02	1.376E-02	9.464E-03	1.776E-03	
Am-241	Np-237	1.000E+00	9.126E-09	2.736E-08	6.371E-08	1.899E-07	5.413E-07	1.671E-06	4.183E-06	6.613E-06	
Am-241	U-233	1.000E+00	9.452E-16	6.613E-15	3.491E-14	3.108E-13	2.586E-12	2.682E-11	2.112E-10	1.053E-09	
Am-241	Th-229	1.000E+00	6.616E-19	9.920E-18	1.156E-16	3.055E-15	7.395E-14	2.551E-12	6.168E-11	1.252E-09	
Am-241	SDSR(j)		1.659E-02	1.656E-02	1.650E-02	1.628E-02	1.569E-02	1.376E-02	9.468E-03	1.783E-03	
OCa-60	Co-60	1.000E+00	5.201E-01	4.560E-01	3.506E-01	1.396E-01	1.006E-02	1.011E-06	3.821E-18	0.000E+00	
OCs-137	Cs-137	1.000E+00	1.146E-01	1.119E-01	1.069E-01	9.089E-02	5.722E-02	1.133E-02	1.108E-04	8.317E-12	
OPu-238	Pu-238	1.000E+00	1.325E-02	1.314E-02	1.294E-02	1.224E-02	1.045E-02	6.010E-03	1.237E-03	3.249E-06	
Pu-238	U-234	1.000E+00	5.490E-09	1.641E-08	3.799E-08	1.108E-07	2.976E-07	7.567E-07	1.223E-06	8.061E-07	
Pu-238	Th-230	1.000E+00	4.025E-14	2.811E-13	1.478E-12	1.298E-11	1.039E-10	9.482E-10	5.578E-09	1.653E-08	
Pu-238	Ra-226	1.000E+00	1.774E-16	2.657E-15	3.087E-14	8.066E-13	1.892E-11	5.880E-10	1.105E-08	1.300E-07	
Pu-238	Pb-210	1.000E+00	1.337E-20	4.116E-19	1.021E-17	7.565E-16	4.620E-14	3.428E-12	1.034E-10	1.328E-09	
Pu-238	Po-210	1.000E+00	1.173E-21	5.992E-20	2.227E-18	2.273E-16	1.575E-14	1.227E-12	3.751E-11	4.740E-10	
Pu-238	SDSR(j)		1.325E-02	1.314E-02	1.294E-02	1.224E-02	1.045E-02	6.011E-03	1.238E-03	4.204E-06	
OPu-239	Pu-239	1.000E+00	1.459E-02	1.459E-02	1.458E-02	1.458E-02	1.458E-02	1.454E-02	1.445E-02	9.378E-03	
Pu-239	U-235	1.000E+00	1.481E-11	4.443E-11	1.036E-10	3.107E-10	9.010E-10	2.949E-09	8.656E-09	2.372E-08	
Pu-239	Pa-231	1.000E+00	1.742E-16	1.220E-15	6.445E-15	5.761E-14	4.848E-13	5.224E-12	4.573E-11	3.248E-10	
Pu-239	Ac-227	1.000E+00	7.326E-18	1.091E-16	1.254E-15	3.149E-14	6.648E-13	1.558E-11	1.968E-10	1.679E-09	
Pu-239	SDSR(j)		1.459E-02	1.459E-02	1.458E-02	1.458E-02	1.457E-02	1.454E-02	1.445E-02	9.378E-03	
OSr-90	Sr-90	1.000E+00	9.830E-04	9.597E-04	9.148E-04	7.734E-04	4.787E-04	8.932E-05	7.374E-07	3.194E-14	
OU-234	U-234	1.000E+00	3.883E-03	3.882E-03	3.881E-03	3.877E-03	3.865E-03	3.822E-03	3.703E-03	2.203E-03	
U-234	Th-230	1.000E+00	4.268E-08	1.280E-07	2.987E-07	8.955E-07	2.597E-06	8.508E-06	2.502E-05	5.227E-05	
U-234	Ra-226	1.000E+00	2.507E-10	1.755E-09	9.271E-09	8.281E-08	6.951E-07	7.429E-06	6.351E-05	4.557E-04	
U-234	Pb-210	1.000E+00	2.358E-14	3.513E-13	4.037E-12	1.015E-10	2.147E-09	5.041E-08	6.282E-07	4.689E-06	
U-234	Po-210	1.000E+00	2.392E-15	5.833E-14	9.722E-13	3.191E-11	7.448E-10	1.813E-08	2.281E-07	1.674E-06	
U-234	SDSR(j)		3.883E-03	3.883E-03	3.882E-03	3.878E-03	3.868E-03	3.838E-03	3.793E-03	2.718E-03	
OU-235	U-235	1.000E+00	3.008E-02	3.007E-02	3.006E-02	3.003E-02	2.994E-02	2.961E-02	2.871E-02	2.262E-02	
U-235	Pa-231	1.000E+00	5.307E-07	1.592E-06	3.714E-06	1.113E-05	3.224E-05	1.052E-04	3.056E-04	6.351E-04	
U-235	Ac-227	1.000E+00	2.971E-08	2.060E-07	1.067E-06	8.876E-06	6.166E-05	3.905E-04	1.450E-03	3.388E-03	
U-235	SDSR(j)		3.008E-02	3.007E-02	3.007E-02	3.005E-02	3.003E-02	3.011E-02	3.046E-02	2.664E-02	
OU-238	U-238	1.000E+00	8.697E-03	8.695E-03	8.693E-03	8.683E-03	8.656E-03	8.563E-03	8.301E-03	5.598E-03	
U-238	U-234	1.000E+00	5.504E-09	1.651E-08	3.851E-08	1.154E-07	3.342E-07	1.089E-06	3.156E-06	6.258E-06	
U-238	Th-230	1.000E+00	4.033E-14	2.823E-13	1.492E-12	1.334E-11	1.122E-10	1.209E-09	1.058E-08	7.235E-08	
U-238	Ra-226	1.000E+00	1.777E-16	2.665E-15	3.108E-14	8.231E-13	2.005E-11	7.068E-10	1.813E-08	4.376E-07	
U-238	Pb-210	1.000E+00	1.339E-20	4.126E-19	1.027E-17	7.690E-16	4.847E-14	4.022E-12	1.640E-10	4.365E-09	
U-238	Po-210	1.000E+00	1.174E-21	6.006E-20	2.238E-18	2.309E-16	1.651E-14	1.438E-12	5.942E-11	1.558E-09	
U-238	SDSR(j)		8.697E-03	8.695E-03	8.693E-03	8.683E-03	8.657E-03	8.564E-03	8.304E-03	5.605E-03	
*****											
*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).											
\$ is used to indicate summation; the Greek sigma is not included in this font.											
The DSR includes contributions from associated (half-life <= 30 days) daughters.											

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

ONuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	1.507E+03	1.510E+03	1.515E+03	1.535E+03	1.594E+03	1.817E+03	2.640E+03	1.402E+04
Co-60	4.807E+01	5.482E+01	7.132E+01	1.791E+02	2.484E+02	2.473E+07	*1.131E+15	*1.131E+15
Cs-137	2.182E+02	2.233E+02	2.339E+02	2.750E+02	4.369E+02	2.207E+03	2.256E+05	3.006E+12
Pu-238	1.887E+03	1.902E+03	1.933E+03	2.043E+03	2.392E+03	4.159E+03	2.019E+04	5.947E+06
Pu-239	1.714E+03	1.714E+03	1.714E+03	1.714E+03	1.716E+03	1.719E+03	1.730E+03	2.666E+03
Sr-90	2.543E+04	2.605E+04	2.733E+04	3.233E+04	5.222E+04	2.799E+05	3.390E+07	*1.363E+14
U-234	6.438E+03	6.439E+03	6.441E+03	6.447E+03	6.463E+03	6.513E+03	6.592E+03	9.199E+03
U-235	8.312E+02	8.313E+02	8.315E+02	8.319E+02	8.325E+02	8.303E+02	8.206E+02	9.385E+02
U-238	2.875E+03	2.875E+03	2.876E+03	2.879E+03	2.888E+03	2.919E+03	3.011E+03	4.461E+03
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*At specific activity limit

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

ONuclide (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)
Am-241	5.900E+00	0.000E+00	1.659E-02	1.507E+03	1.659E-02	1.507E+03
Co-60	1.630E-01	0.000E+00	5.201E-01	4.807E+01	5.201E-01	4.807E+01
Cs-137	9.300E+00	0.000E+00	1.146E-01	2.182E+02	1.146E-01	2.182E+02
Pu-238	2.100E+00	0.000E+00	1.325E-02	1.887E+03	1.325E-02	1.887E+03
Pu-239	1.010E+01	0.000E+00	1.459E-02	1.714E+03	1.459E-02	1.714E+03
Sr-90	1.900E+00	0.000E+00	9.830E-04	2.543E+04	9.830E-04	2.543E+04
U-234	1.100E+00	910 ± 2	3.927E-03	6.366E+03	3.883E-03	6.438E+03
U-235	1.000E-01	861 ± 2	3.174E-02	7.878E+02	3.008E-02	8.312E+02
U-238	1.100E+00	0.000E+00	8.697E-03	2.875E+03	8.697E-03	2.875E+03
=====	=====	=====	=====	=====	=====	=====

Individual Nuclide Dose Summed Over All Pathways									
Parent Nuclide and Branch Fraction Indicated				DOSE(j,t), mrem/yr					
ONuclide (j)	Parent (i)	BRF(i)	t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02 3.000E+02 1.000E+03
Am-241	Am-241	1.000E+00		9.789E-02	9.771E-02	9.735E-02	9.608E-02	9.255E-02	8.119E-02 5.584E-02 1.048E-02
ONp-237	Am-241	1.000E+00		5.384E-08	1.614E-07	3.759E-07	1.120E-06	3.193E-06	9.861E-06 2.468E-05 3.902E-05
OU-233	Am-241	1.000E+00		5.577E-15	3.901E-14	2.060E-13	1.834E-12	1.526E-11	1.582E-10 1.246E-09 6.214E-09
OTh-229	Am-241	1.000E+00		3.904E-18	5.853E-17	6.821E-16	1.802E-14	4.363E-13	1.505E-11 3.639E-10 7.387E-09
OCo-60	Co-60	1.000E+00		8.478E-02	7.433E-02	5.714E-02	2.276E-02	1.640E-03	1.648E-07 6.228E-19 0.000E+00
OCs-137	Cs-137	1.000E+00		1.065E+00	1.041E+00	9.939E-01	8.453E-01	5.322E-01	1.054E-01 1.030E-03 7.735E-11
OPu-238	Pu-238	1.000E+00		2.782E-02	2.760E-02	2.716E-02	2.570E-02	2.194E-02	1.262E-02 2.598E-03 6.823E-06
OU-234	Pu-238	1.000E+00		1.153E-08	3.446E-08	7.978E-08	2.328E-07	6.250E-07	1.589E-06 2.569E-06 1.693E-06
U-234	U-234	1.000E+00		4.271E-03	4.271E-03	4.269E-03	4.265E-03	4.251E-03	4.204E-03 4.074E-03 2.424E-03
U-234	U-238	1.000E+00		6.055E-09	1.816E-08	4.236E-08	1.269E-07	3.676E-07	1.198E-06 3.472E-06 6.884E-06
U-234	\$DOSE(j)			4.271E-03	4.271E-03	4.270E-03	4.265E-03	4.252E-03	4.207E-03 4.080E-03 2.432E-03
OTh-230	Pu-238	1.000E+00		8.453E-14	5.904E-13	3.104E-12	2.726E-11	2.181E-10	1.991E-09 1.171E-08 3.471E-08
Th-230	U-234	1.000E+00		4.695E-08	1.408E-07	3.286E-07	9.851E-07	2.857E-06	9.358E-06 2.752E-05 5.750E-05
Th-230	U-238	1.000E+00		4.436E-14	3.105E-13	1.641E-12	1.467E-11	1.234E-10	1.330E-09 1.164E-08 7.959E-08
Th-230	\$DOSE(j)			4.695E-08	1.408E-07	3.286E-07	9.851E-07	2.857E-06	9.362E-06 2.754E-05 5.761E-05
ORa-226	Pu-238	1.000E+00		3.726E-16	5.579E-15	6.482E-14	1.694E-12	3.973E-11	1.235E-09 2.321E-08 2.731E-07
Ra-226	U-234	1.000E+00		2.758E-10	1.930E-09	1.020E-08	9.109E-08	7.646E-07	8.172E-06 6.986E-05 5.013E-04
Ra-226	U-238	1.000E+00		1.955E-16	2.932E-15	3.419E-14	9.054E-13	2.205E-11	7.774E-10 1.994E-08 4.814E-07
Ra-226	\$DOSE(j)			2.758E-10	1.930E-09	1.020E-08	9.110E-08	7.647E-07	8.174E-06 6.990E-05 5.020E-04
OPb-210	Pu-238	1.000E+00		2.807E-20	8.643E-19	2.145E-17	1.589E-15	9.702E-14	7.199E-12 2.172E-10 2.788E-09
Pb-210	U-234	1.000E+00		2.594E-14	3.864E-13	4.441E-12	1.116E-10	2.362E-09	5.545E-08 6.910E-07 5.158E-06
Pb-210	U-238	1.000E+00		1.472E-20	4.539E-19	1.130E-17	8.459E-16	5.331E-14	4.424E-12 1.804E-10 4.802E-09
Pb-210	\$DOSE(j)			2.594E-14	3.864E-13	4.441E-12	1.116E-10	2.362E-09	5.546E-08 6.914E-07 5.166E-06
OPo-210	Pu-238	1.000E+00		2.462E-21	1.258E-19	4.676E-18	4.773E-16	3.309E-14	2.576E-12 7.878E-11 9.954E-10
Po-210	U-234	1.000E+00		2.631E-15	6.417E-14	1.069E-12	3.510E-11	8.192E-10	1.994E-08 2.509E-07 1.842E-06
Po-210	U-238	1.000E+00		1.291E-21	6.607E-20	2.462E-18	2.540E-16	1.817E-14	1.582E-12 6.536E-11 1.714E-09
Po-210	\$DOSE(j)			2.631E-15	6.417E-14	1.069E-12	3.510E-11	8.193E-10	1.995E-08 2.510E-07 1.845E-06
OPu-239	Pu-239	1.000E+00		1.473E-01	1.473E-01	1.473E-01	1.473E-01	1.472E-01	1.469E-01 1.459E-01 9.472E-02
OU-235	Pu-239	1.000E+00		1.496E-10	4.487E-10	1.047E-09	3.139E-09	9.100E-09	2.979E-08 8.743E-08 2.396E-07
U-235	U-235	1.000E+00		3.008E-03	3.007E-03	3.006E-03	3.003E-03	2.994E-03	2.961E-03 2.871E-03 2.262E-03
U-235	\$DOSE(j)			3.008E-03	3.007E-03	3.006E-03	3.003E-03	2.994E-03	2.961E-03 2.871E-03 2.262E-03
OPa-231	Pu-239	1.000E+00		1.760E-15	1.232E-14	6.509E-14	5.819E-13	4.896E-12	5.277E-11 4.619E-10 3.281E-09
Pa-231	U-235	1.000E+00		5.307E-08	1.592E-07	3.714E-07	1.113E-06	3.224E-06	1.052E-05 3.056E-05 6.351E-05
Pa-231	\$DOSE(j)			5.307E-08	1.592E-07	3.714E-07	1.113E-06	3.224E-06	1.052E-05 3.056E-05 6.352E-05

Individual Nuclide Dose Summed Over All Pathways									
Parent Nuclide and Branch Fraction Indicated		DOSE(j,t), mrem/yr							
ONuclide (j)	Parent (i)	BRF(i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02
Ac-227	Pu-239	1.000E+00	7.399E-17	1.102E-15	1.266E-14	3.180E-13	6.715E-12	1.573E-10	1.988E-09
Ac-227	U-235	1.000E+00	2.971E-09	2.060E-08	1.067E-07	8.876E-07	6.166E-06	3.905E-05	1.450E-04
Ac-227	\$DOSE(j)		2.971E-09	2.060E-08	1.067E-07	8.876E-07	6.166E-06	3.905E-05	1.450E-04
OSr-90	Sr-90	1.000E+00	1.868E-03	1.823E-03	1.738E-03	1.469E-03	9.096E-04	1.697E-04	1.401E-06
OU-238	U-238	1.000E+00	9.566E-03	9.565E-03	9.562E-03	9.551E-03	9.522E-03	9.419E-03	9.131E-03
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BRF(i) is the branch fraction of the parent nuclide.
\$ is used to indicate summation; the Greek sigma is not included in this font.

Individual Nuclide Soil Concentration									
ONuclide (j)	Parent (i)	BRF(i)	Parent Nuclide and Branch Fraction Indicated						
			t=	0.000E+00	1.000E+00	3.000E+00	1.000E+00	S(j,t), pCi/g	
Am-241	Am-241	1.000E+00	5.900E+00	5.889E+00	5.867E+00	5.791E+00	5.578E+00	4.893E+00	3.365E+00 9.081E-01
ONp-237	Am-241	1.000E+00	0.000E+00	1.909E-06	5.717E-06	1.893E-05	5.573E-05	1.741E-04	4.372E-04 8.521E-04
OU-233	Am-241	1.000E+00	0.000E+00	4.176E-12	3.753E-11	4.151E-10	3.686E-09	3.912E-08	3.102E-07 2.326E-06
OTH-229	Am-241	1.000E+00	0.000E+00	1.322E-16	3.565E-15	1.316E-13	3.515E-12	1.256E-10	3.066E-09 8.261E-08
OCO-60	Co-60	1.000E+00	1.630E-01	1.429E-01	1.099E-01	4.376E-02	3.154E-03	3.169E-07	1.198E-18 0.000E+00
OCs-137	Cs-137	1.000E+00	9.300E+00	9.087E+00	8.676E+00	7.379E+00	4.646E+00	9.197E-01	8.995E-03 8.322E-10
OPu-238	Pu-238	1.000E+00	2.100E+00	2.083E+00	2.051E+00	1.940E+00	1.657E+00	9.528E-01	1.961E-01 7.764E-04
OU-234	Pu-238	1.000E+00	0.000E+00	5.929E-06	1.765E-05	5.720E-05	1.586E-04	4.079E-04	6.613E-04 6.561E-04
U-234	U-234	1.000E+00	1.100E+00	1.100E+00	1.099E+00	1.098E+00	1.095E+00	1.083E+00	1.049E+00 9.393E-01
U-234	U-238	1.000E+00	0.000E+00	3.118E-06	9.351E-06	3.114E-05	9.312E-05	3.070E-04	8.926E-04 2.667E-03
U-234	SS(j) :		1.100E+00	1.100E+00	1.100E+00	1.098E+00	1.095E+00	1.083E+00	1.051E+00 9.426E-01
OTH-230	Pu-238	1.000E+00	0.000E+00	2.672E-11	2.392E-10	2.609E-09	2.228E-08	2.081E-07	1.232E-06 5.503E-06
Th-230	U-234	1.000E+00	0.000E+00	9.901E-06	2.970E-05	9.894E-05	2.963E-04	9.820E-04	2.897E-03 9.117E-03
Th-230	U-238	1.000E+00	0.000E+00	1.403E-11	1.263E-10	1.402E-09	1.259E-08	1.389E-07	1.223E-06 1.261E-05
Th-230	SS(j) :		0.000E+00	9.901E-06	2.970E-05	9.894E-05	2.964E-04	9.823E-04	2.900E-03 9.135E-03
ORa-226	Pu-238	1.000E+00	0.000E+00	3.861E-15	1.038E-13	3.788E-12	9.806E-11	3.156E-09	5.991E-08 9.371E-07
Ra-226	U-234	1.000E+00	0.000E+00	2.144E-09	1.929E-08	2.140E-07	1.917E-06	2.097E-05	1.805E-04 1.720E-03
Ra-226	U-238	1.000E+00	0.000E+00	2.026E-15	5.469E-14	2.023E-12	5.439E-11	1.985E-09	5.143E-08 1.651E-06
Ra-226	SS(j) :		0.000E+00	2.144E-09	1.929E-08	2.140E-07	1.918E-06	2.098E-05	1.806E-04 1.723E-03
OPb-210	Pu-238	1.000E+00	0.000E+00	2.983E-17	2.378E-15	2.781E-13	1.939E-11	1.506E-09	4.602E-08 8.761E-07
Pb-210	U-234	1.000E+00	0.000E+00	2.205E-11	5.860E-10	2.056E-08	4.799E-07	1.166E-05	1.465E-04 1.621E-03
Pb-210	U-238	1.000E+00	0.000E+00	1.565E-17	1.252E-15	1.479E-13	1.065E-11	9.250E-10	3.818E-08 1.508E-06
Pb-210	SS(j) :		0.000E+00	2.205E-11	5.860E-10	2.056E-08	4.800E-07	1.166E-05	1.466E-04 1.623E-03
OPo-210	Pu-238	1.000E+00	0.000E+00	8.301E-18	1.313E-15	2.269E-13	1.811E-11	1.478E-09	4.577E-08 8.748E-07
Po-210	U-234	1.000E+00	0.000E+00	7.290E-12	3.621E-10	1.759E-08	4.562E-07	1.150E-05	1.459E-04 1.619E-03
Po-210	U-238	1.000E+00	0.000E+00	4.354E-18	6.905E-16	1.206E-13	9.937E-12	9.070E-10	3.795E-08 1.506E-06
Po-210	SS(j) :		0.000E+00	7.290E-12	3.621E-10	1.760E-08	4.562E-07	1.150E-05	1.460E-04 1.621E-03
OPu-239	Pu-239	1.000E+00	1.010E+01	1.010E+01	1.010E+01	1.010E+01	1.009E+01	1.007E+01	1.000E+01 9.787E+00
OU-235	Pu-239	1.000E+00	0.000E+00	9.946E-09	2.983E-08	9.938E-08	2.976E-07	9.855E-07	2.902E-06 9.066E-06
U-235	U-235	1.000E+00	1.000E-01	9.998E-02	9.995E-02	9.984E-02	9.954E-02	9.846E-02	9.545E-02 8.563E-02
U-235	SS(j) :		1.000E-01	9.998E-02	9.995E-02	9.985E-02	9.954E-02	9.846E-02	9.546E-02 8.564E-02
OPa-231	Pu-239	1.000E+00	0.000E+00	1.052E-13	9.468E-13	1.051E-11	9.441E-11	1.041E-09	9.176E-09 9.473E-08
Pa-231	U-235	1.000E+00	0.000E+00	2.116E-06	6.345E-06	2.113E-05	6.320E-05	2.086E-04	6.082E-04 1.835E-03
Pa-231	SS(j) :		0.000E+00	2.116E-06	6.345E-06	2.113E-05	6.320E-05	2.086E-04	6.082E-04 1.835E-03

Individual Nuclide Soil Concentration									
Parent Nuclide and Branch		Fraction Indicated							
ONuclide	Parent	BRF(i)	S(j,t), pCi/g						
(j)	(i)		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02
Ac-227	Pu-239	1.000E+00	0.000E+00	1.108E-15	2.943E-14	1.032E-12	2.403E-11	5.825E-10	7.425E-09
Ac-227	U-235	1.000E+00	0.000E+00	3.332E-08	2.935E-07	3.032E-06	2.247E-05	1.454E-04	5.426E-04
Ac-227	SS(j):		0.000E+00	3.332E-08	2.935E-07	3.032E-06	2.247E-05	1.454E-04	5.426E-04
OSr-90	Sr-90	1.000E+00	1.900E+00	1.855E+00	1.768E+00	1.495E+00	9.253E-01	1.726E-01	1.425E-03
OU-238	U-238	1.000E+00	1.100E+00	1.100E+00	1.099E+00	1.098E+00	1.095E+00	1.083E+00	1.050E+00
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====

BRF(i) is the branch fraction of the parent nuclide.
\$ is used to indicate summation; the Greek sigma is not included in this font.
0RESCALC.EXE execution time = 2.59 seconds

Exhibit 2

RESRAD Scenario CAS 10-09-02 Hot Spot 100m²

(27 Pages)

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines
=====

Dose Conversion Factor (and Related) Parameter Summary ...	2
Site-Specific Parameter Summary	6
Summary of Pathway Selections	12
Contaminated Zone and Total Dose Summary	13
Total Dose Components	
Time = 0.000E+00	14
Time = 1.000E+00	15
Time = 3.000E+00	16
Time = 1.000E+01	17
Time = 3.000E+01	18
Time = 1.000E+02	19
Time = 3.000E+02	20
Time = 1.000E+03	21
Dose/Source Ratios Summed Over All Pathways	22
Single Radionuclide Soil Guidelines	23
Dose Per Nuclide Summed Over All Pathways	24
Soil Concentration Per Nuclide	26

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	Am-241	4.440E-01	4.440E-01	DCF2 (2)
B-1	Co-60	2.190E-04	2.190E-04	DCF2 (3)
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2 (4)
B-1	Np-237+D	5.400E-01	5.400E-01	DCF2 (5)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2 (6)
B-1	Pb-210+D	1.380E-02	1.380E-02	DCF2 (7)
B-1	Po-210	9.400E-03	9.400E-03	DCF2 (8)
B-1	Pu-238	3.920E-01	3.920E-01	DCF2 (9)
B-1	Pu-239	4.290E-01	4.290E-01	DCF2 (10)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2 (11)
B-1	Sr-90+D	1.310E-03	1.310E-03	DCF2 (12)
B-1	Th-229+D	2.160E+00	2.160E+00	DCF2 (13)
B-1	Th-230	3.260E-01	3.260E-01	DCF2 (14)
B-1	U-233	1.350E-01	1.350E-01	DCF2 (15)
B-1	U-234	1.320E-01	1.320E-01	DCF2 (16)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2 (17)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2 (18)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3 (1)
D-1	Am-241	3.640E-03	3.640E-03	DCF3 (2)
D-1	Co-60	2.690E-05	2.690E-05	DCF3 (3)
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3 (4)
D-1	Np-237+D	4.440E-03	4.440E-03	DCF3 (5)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3 (6)
D-1	Pb-210+D	5.370E-03	5.370E-03	DCF3 (7)
D-1	Po-210	1.900E-03	1.900E-03	DCF3 (8)
D-1	Pu-238	3.200E-03	3.200E-03	DCF3 (9)
D-1	Pu-239	3.540E-03	3.540E-03	DCF3 (10)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3 (11)
D-1	Sr-90+D	1.530E-04	1.530E-04	DCF3 (12)
D-1	Th-229+D	4.030E-03	4.030E-03	DCF3 (13)
D-1	Th-230	5.480E-04	5.480E-04	DCF3 (14)
D-1	U-233	2.890E-04	2.890E-04	DCF3 (15)
D-1	U-234	2.830E-04	2.830E-04	DCF3 (16)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3 (17)
D-1	U-238+D	2.690E-04	2.690E-04	DCF3 (18)
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	Am-241 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (2,1)
D-34	Am-241 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-05	5.000E-05	RTF (2,2)
D-34	Am-241 , milk/livestock-intake ratio, (pCi/L) / (pCi/d)	2.000E-06	2.000E-06	RTF (2,3)

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

File: FGR 13 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF (3,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF (3,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF (3,3)
D-34				
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF (4,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF (4,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF (4,3)
D-34				
D-34	Np-237+D , plant/soil concentration ratio, dimensionless	2.000E-02	2.000E-02	RTF (5,1)
D-34	Np-237+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF (5,2)
D-34	Np-237+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF (5,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF (6,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF (6,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF (6,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF (7,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF (7,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF (7,3)
D-34				
D-34	Po-210 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (8,1)
D-34	Po-210 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF (8,2)
D-34	Po-210 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.400E-04	3.400E-04	RTF (8,3)
D-34				
D-34	Pu-238 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (9,1)
D-34	Pu-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF (9,2)
D-34	Pu-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF (9,3)
D-34				
D-34	Pu-239 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(10,1)
D-34	Pu-239 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(10,2)
D-34	Pu-239 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(10,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(11,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(11,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(11,3)
D-34				
D-34	Sr-90+D , plant/soil concentration ratio, dimensionless	3.000E-01	3.000E-01	RTF(12,1)
D-34	Sr-90+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-03	8.000E-03	RTF(12,2)
D-34	Sr-90+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(12,3)
D-34				
D-34	Th-229+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(13,1)
D-34	Th-229+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(13,2)
D-34	Th-229+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(13,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(14,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(14,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(14,3)
D-34				
D-34	U-233 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(15,1)
D-34	U-233 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(15,2)
D-34	U-233 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(15,3)

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

File: FGR 13 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
0				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(16,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(16,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(16,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(17,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(17,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(17,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(18,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(18,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(18,3)
D-5				
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	Am-241 , fish	3.000E+01	3.000E+01	BIOFAC(2,1)
D-5	Am-241 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(2,2)
D-5				
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(3,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(3,2)
D-5				
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(4,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(4,2)
D-5				
D-5	Np-237+D , fish	3.000E+01	3.000E+01	BIOFAC(5,1)
D-5	Np-237+D , crustacea and mollusks	4.000E+02	4.000E+02	BIOFAC(5,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(6,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(6,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(7,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(7,2)
D-5				
D-5	Po-210 , fish	1.000E+02	1.000E+02	BIOFAC(8,1)
D-5	Po-210 , crustacea and mollusks	2.000E+04	2.000E+04	BIOFAC(8,2)
D-5				
D-5	Pu-238 , fish	3.000E+01	3.000E+01	BIOFAC(9,1)
D-5	Pu-238 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(9,2)
D-5				
D-5	Pu-239 , fish	3.000E+01	3.000E+01	BIOFAC(10,1)
D-5	Pu-239 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(10,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(11,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(11,2)
D-5				
D-5	Sr-90+D , fish	6.000E+01	6.000E+01	BIOFAC(12,1)
D-5	Sr-90+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(12,2)
D-5				
D-5	Th-229+D , fish	1.000E+02	1.000E+02	BIOFAC(13,1)
D-5	Th-229+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(13,2)

Site-Specific Parameter Summary							
	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
0	R011	Area of contaminated zone (m**2)	1.000E+02	1.000E+04		---	AREA
	R011	Thickness of contaminated zone (m)	3.000E-01	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	2.500E+01		---	BRDL
	R011	Time since placement of material (yr)	0.000E+00	0.000E+00		---	TI
	R011	Times for calculations (yr)	1.000E+00	1.000E+00		---	T (2)
	R011	Times for calculations (yr)	3.000E+00	3.000E+00		---	T (3)
	R011	Times for calculations (yr)	1.000E+01	1.000E+01		---	T (4)
	R011	Times for calculations (yr)	3.000E+01	3.000E+01		---	T (5)
	R011	Times for calculations (yr)	1.000E+02	1.000E+02		---	T (6)
	R011	Times for calculations (yr)	3.000E+02	3.000E+02		---	T (7)
	R011	Times for calculations (yr)	1.000E+03	1.000E+03		---	T (8)
	R011	Times for calculations (yr)	not used	0.000E+00		---	T (9)
	R011	Times for calculations (yr)	not used	0.000E+00		---	T(10)
	R012	Initial principal radionuclide (pCi/g): Am-241	7.130E+00	0.000E+00		---	S1 (2)
	R012	Initial principal radionuclide (pCi/g): Co-60	1.600E-01	0.000E+00		---	S1 (3)
	R012	Initial principal radionuclide (pCi/g): Cs-137	1.940E+01	0.000E+00		---	S1 (4)
	R012	Initial principal radionuclide (pCi/g): Pu-238	4.010E+00	0.000E+00		---	S1 (9)
	R012	Initial principal radionuclide (pCi/g): Pu-239	2.500E+01	0.000E+00		---	S1(10)
	R012	Initial principal radionuclide (pCi/g): Sr-90	2.520E+00	0.000E+00		---	S1(12)
R012	Initial principal radionuclide (pCi/g): U-234	1.290E+00	0.000E+00		---	S1(16)	
R012	Initial principal radionuclide (pCi/g): U-235	1.270E-01	0.000E+00		---	S1(17)	
R012	Initial principal radionuclide (pCi/g): U-238	1.380E+00	0.000E+00		---	S1(18)	
R012	Concentration in groundwater (pCi/L): Am-241	not used	0.000E+00		---	W1 (2)	
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00		---	W1 (3)	
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00		---	W1 (4)	
R012	Concentration in groundwater (pCi/L): Pu-238	not used	0.000E+00		---	W1 (9)	
R012	Concentration in groundwater (pCi/L): Pu-239	not used	0.000E+00		---	W1(10)	
R012	Concentration in groundwater (pCi/L): Sr-90	not used	0.000E+00		---	W1(12)	
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00		---	W1(16)	
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00		---	W1(17)	
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00		---	W1(18)	
R013	Cover depth (m)		0.000E+00	0.000E+00		---	COVER0
R013	Density of cover material (g/cm**3)		not used	1.500E+00		---	DENSCV
R013	Cover depth erosion rate (m/yr)		not used	1.000E-03		---	VCV
R013	Density of contaminated zone (g/cm**3)		1.500E+00	1.500E+00		---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)		1.000E-03	1.000E-03		---	VCZ
R013	Contaminated zone total porosity		4.000E-01	4.000E-01		---	TPCZ
R013	Contaminated zone field capacity		2.000E-01	2.000E-01		---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)		1.000E+01	1.000E+01		---	HCCZ
R013	Contaminated zone b parameter		5.300E+00	5.300E+00		---	BCZ
R013	Average annual wind speed (m/sec)		3.500E+00	2.000E+00		---	WIND
R013	Humidity in air (g/m**3)		not used	8.000E+00		---	HUMID
R013	Evapotranspiration coefficient		5.000E-01	5.000E-01		---	EVAPTR
R013	Precipitation (m/yr)		3.000E-02	1.000E+00		---	PRECIP
R013	Irrigation (m/yr)		2.000E-01	2.000E-01		---	RI
R013	Irrigation mode		overhead	overhead		---	IDITCH
R013	Runoff coefficient		4.000E-01	2.000E-01		---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)		not used	1.000E+06		---	WAREA

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
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							
R015		Number of unsaturated zone strata	not used	1		---	NS
R015		Unsat. zone 1, thickness (m)	not used	4.000E+00		---	H(1)
R015		Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00		---	DENSUZ(1)
R015		Unsat. zone 1, total porosity	not used	4.000E-01		---	TPUZ(1)
R015		Unsat. zone 1, effective porosity	not used	2.000E-01		---	EPUZ(1)
R015		Unsat. zone 1, field capacity	not used	2.000E-01		---	FCUZ(1)
R015		Unsat. zone 1, soil-specific b parameter	not used	5.300E+00		---	BUZ(1)
R015		Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01		---	HCUZ(1)
R016							
R016		Distribution coefficients for Am-241					
R016		Contaminated zone (cm**3/g)	2.000E+01	2.000E+01		---	DCNUCC(2)
R016		Unsat. zone 1 (cm**3/g)	not used	2.000E+01		---	DCNUCU(2,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+01		---	DCNUCS(2)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.200E-02 not used	ALEACH(2)
R016		Solubility constant	0.000E+00	0.000E+00			SOLUBK(2)
R016							
R016		Distribution coefficients for Co-60					
R016		Contaminated zone (cm**3/g)	1.000E+03	1.000E+03		---	DCNUCC(3)
R016		Unsat. zone 1 (cm**3/g)	not used	1.000E+03		---	DCNUCU(3,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+03		---	DCNUCS(3)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		2.422E-04 not used	ALEACH(3)
R016		Solubility constant	0.000E+00	0.000E+00			SOLUBK(3)
R016							
R016		Distribution coefficients for Cs-137					
R016		Contaminated zone (cm**3/g)	1.700E+02	1.000E+03		---	DCNUCC(4)
R016		Unsat. zone 1 (cm**3/g)	not used	1.000E+03		---	DCNUCU(4,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+03		---	DCNUCS(4)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.423E-03 not used	ALEACH(4)
R016		Solubility constant	0.000E+00	0.000E+00			SOLUBK(4)
R016							
R016		Distribution coefficients for Pu-238					
R016		Contaminated zone (cm**3/g)	2.000E+03	2.000E+03		---	DCNUCC(9)
R016		Unsat. zone 1 (cm**3/g)	not used	2.000E+03		---	DCNUCU(9,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+03		---	DCNUCS(9)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.211E-04 not used	ALEACH(9)
R016		Solubility constant	0.000E+00	0.000E+00			SOLUBK(9)

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
		Distribution coefficients for Pu-239					
R016		Contaminated zone (cm**3/g)	2.000E+03	2.000E+03		---	DCNUCC (10)
R016		Unsaturated zone 1 (cm**3/g)	not used	2.000E+03		---	DCNUCU (10,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+03		---	DCNUCS (10)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.211E-04	ALEACH (10)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (10)
		Distribution coefficients for Sr-90					
R016		Contaminated zone (cm**3/g)	3.000E+01	3.000E+01		---	DCNUCC (12)
R016		Unsaturated zone 1 (cm**3/g)	not used	3.000E+01		---	DCNUCU (12,1)
R016		Saturated zone (cm**3/g)	not used	3.000E+01		---	DCNUCS (12)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		8.023E-03	ALEACH (12)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (12)
		Distribution coefficients for U-234					
R016		Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC (16)
R016		Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (16,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (16)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		6.883E-03	ALEACH (16)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (16)
		Distribution coefficients for U-235					
R016		Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC (17)
R016		Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (17,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (17)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		6.883E-03	ALEACH (17)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (17)
		Distribution coefficients for U-238					
R016		Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC (18)
R016		Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (18,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (18)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		6.883E-03	ALEACH (18)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (18)
		Distribution coefficients for daughter Ac-227					
R016		Contaminated zone (cm**3/g)	2.000E+01	2.000E+01		---	DCNUCC (1)
R016		Unsaturated zone 1 (cm**3/g)	not used	2.000E+01		---	DCNUCU (1,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+01		---	DCNUCS (1)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.200E-02	ALEACH (1)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (1)
		Distribution coefficients for daughter Np-237					
R016		Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00		2.574E+02	DCNUCC (5)
R016		Unsaturated zone 1 (cm**3/g)	not used	-1.000E+00		---	DCNUCU (5,1)
R016		Saturated zone (cm**3/g)	not used	-1.000E+00		---	DCNUCS (5)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		9.402E-04	ALEACH (5)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (5)

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
		Distribution coefficients for daughter Pa-231					
R016		Contaminated zone (cm**3/g)	5.000E+01	5.000E+01		---	DCNUCC (6)
R016		Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (6,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (6)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		4.826E-03	ALEACH (6)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (6)
		Distribution coefficients for daughter Pb-210					
R016		Contaminated zone (cm**3/g)	1.000E+02	1.000E+02		---	DCNUCC (7)
R016		Unsaturated zone 1 (cm**3/g)	not used	1.000E+02		---	DCNUCU (7,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+02		---	DCNUCS (7)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		2.418E-03	ALEACH (7)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (7)
		Distribution coefficients for daughter Po-210					
R016		Contaminated zone (cm**3/g)	1.000E+01	1.000E+01		---	DCNUCC (8)
R016		Unsaturated zone 1 (cm**3/g)	not used	1.000E+01		---	DCNUCU (8,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+01		---	DCNUCS (8)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		2.377E-02	ALEACH (8)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (8)
		Distribution coefficients for daughter Ra-226					
R016		Contaminated zone (cm**3/g)	7.000E+01	7.000E+01		---	DCNUCC (11)
R016		Unsaturated zone 1 (cm**3/g)	not used	7.000E+01		---	DCNUCU (11,1)
R016		Saturated zone (cm**3/g)	not used	7.000E+01		---	DCNUCS (11)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		3.451E-03	ALEACH (11)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (11)
		Distribution coefficients for daughter Th-229					
R016		Contaminated zone (cm**3/g)	6.000E+04	6.000E+04		---	DCNUCC (13)
R016		Unsaturated zone 1 (cm**3/g)	not used	6.000E+04		---	DCNUCU (13,1)
R016		Saturated zone (cm**3/g)	not used	6.000E+04		---	DCNUCS (13)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		4.037E-06	ALEACH (13)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (13)
		Distribution coefficients for daughter Th-230					
R016		Contaminated zone (cm**3/g)	6.000E+04	6.000E+04		---	DCNUCC (14)
R016		Unsaturated zone 1 (cm**3/g)	not used	6.000E+04		---	DCNUCU (14,1)
R016		Saturated zone (cm**3/g)	not used	6.000E+04		---	DCNUCS (14)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		4.037E-06	ALEACH (14)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (14)
		Distribution coefficients for daughter U-233					
R016		Contaminated zone (cm**3/g)	5.000E+01	5.000E+01		---	DCNUCC (15)
R016		Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (15,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (15)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		4.826E-03	ALEACH (15)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (15)
R017		Inhalation rate (m**3/yr)	1.230E+04	8.400E+03		---	INHALR
R017		Mass loading for inhalation (g/m**3)	6.000E-04	1.000E-04		---	MLINH

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
R017		Exposure duration	2.500E+01	3.000E+01		---	ED
R017		Shielding factor, inhalation	1.000E+00	4.000E-01		---	SHF3
R017		Shielding factor, external gamma	1.000E+00	7.000E-01		---	SHF1
R017		Fraction of time spent indoors	0.000E+00	5.000E-01		---	FIND
R017		Fraction of time spent outdoors (on site)	3.800E-02	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)	2.010E+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

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
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		---	RDY(1)
R19B		Dry Foliar Interception Fraction for Leafy	not used	2.500E-01		---	RDY(2)
R19B		Dry Foliar Interception Fraction for Fodder	not used	2.500E-01		---	RDY(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
C14		DCF correction factor for gaseous forms of C14	not used	8.894E+01		---	CO2F
STOR		Storage times of contaminated foodstuffs (days) :					
STOR		Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01		---	STOR_T(1)
STOR		Leafy vegetables	1.000E+00	1.000E+00		---	STOR_T(2)
STOR		Milk	1.000E+00	1.000E+00		---	STOR_T(3)
STOR		Meat and poultry	2.000E+01	2.000E+01		---	STOR_T(4)
STOR		Fish	7.000E+00	7.000E+00		---	STOR_T(5)
STOR		Crustacea and mollusks	7.000E+00	7.000E+00		---	STOR_T(6)
STOR		Well water	1.000E+00	1.000E+00		---	STOR_T(7)
STOR		Surface water	1.000E+00	1.000E+00		---	STOR_T(8)
STOR		Livestock fodder	4.500E+01	4.500E+01		---	STOR_T(9)

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
R021		Thickness of building foundation (m)	not used	1.500E-01		---	FLOOR1
R021		Bulk density of building foundation (g/cm**3)	not used	2.400E+00		---	DENSFL
R021		Total porosity of the cover material	not used	4.000E-01		---	TPCV
R021		Total porosity of the building foundation	not used	1.000E-01		---	TPFL
R021		Volumetric water content of the cover material	not used	5.000E-02		---	PH2OCV
R021		Volumetric water content of the foundation	not used	3.000E-02		---	PH2OFL
R021		Diffusion coefficient for radon gas (m/sec) :					
R021		in cover material	not used	2.000E-06		---	DIFCV
R021		in foundation material	not used	3.000E-07		---	DIFFL
R021		in contaminated zone soil	not used	2.000E-06		---	DIFCZ
R021		Radon vertical dimension of mixing (m)	not used	2.000E+00		---	HMX
R021		Average building air exchange rate (1/hr)	not used	5.000E-01		---	REXG
R021		Height of the building (room) (m)	not used	2.500E+00		---	HRM
R021		Building interior area factor	not used	0.000E+00		---	FAI
R021		Building depth below ground surface (m)	not used	-1.000E+00		---	DMFL
R021		Emanating power of Rn-222 gas	not used	2.500E-01		---	EMANA(1)
R021		Emanating power of Rn-220 gas	not used	1.500E-01		---	EMANA(2)
TITL		Number of graphical time points	32	---		---	NPTS
TITL		Maximum number of integration points for dose	17	---		---	LYMAX
TITL		Maximum number of integration points for risk	1	---		---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	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	active
=====	=====

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	100.00 square meters	Am-241	7.130E+00
Thickness:	0.30 meters	Co-60	1.600E-01
Cover Depth:	0.00 meters	Cs-137	1.940E+01
		Pu-238	4.010E+00
		Pu-239	2.500E+01
		Sr-90	2.520E+00
		U-234	1.290E+00
		U-235	1.270E-01
		U-238	1.380E+00

0

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)		Total Dose TDose(t), mrem/yr	
		Basic Radiation Dose Limit = 2.500E+01 mrem/yr	
t (years):	0.000E+00	1.000E+00	3.000E+01
TDose(t):	2.369E+00	2.203E+00	1.878E+00
M(t):	9.477E-02	9.246E-02	8.812E-02
OMaximum TDose(t): 2.369E+00 mrem/yr at t = 0.000E+00 years			

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

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	9.793E-03	0.0041	6.481E-02	0.0274	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.969E-03	0.0008
Co-60	7.080E-02	0.0299	6.767E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.080E-07	0.0000
Cs-137	1.942E+00	0.8197	1.260E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.319E-05	0.0000
Pu-238	2.091E-05	0.0000	3.227E-02	0.0136	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.762E-04	0.0004
Pu-239	2.367E-04	0.0001	2.211E-01	0.0933	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.759E-03	0.0029
Sr-90	1.833E-03	0.0008	6.698E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.899E-05	0.0000
U-234	1.663E-05	0.0000	3.498E-03	0.0015	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.779E-05	0.0000
U-235	2.998E-03	0.0013	3.209E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.582E-06	0.0000
U-238	6.270E-03	0.0026	3.345E-03	0.0014	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.826E-05	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	2.034E+00	0.8585	3.254E-01	0.1373	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.865E-03	0.0042

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

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

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.658E-02	0.0323
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.080E-02	0.0299
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.942E+00	0.8197
Pu-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	3.327E-02	0.0140
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.281E-01	0.0963
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.929E-03	0.0008
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	3.542E-03	0.0015
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	3.322E-03	0.0014
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	9.643E-03	0.0041
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	2.369E+00	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	9.660E-03	0.0042	6.394E-02	0.0277	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.942E-03	0.0008
Co-60	6.204E-02	0.0268	5.932E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.700E-07	0.0000
Cs-137	1.895E+00	0.8196	1.230E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.141E-05	0.0000
Pu-238	2.074E-05	0.0000	3.201E-02	0.0138	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.684E-04	0.0004
Pu-239	2.367E-04	0.0001	2.210E-01	0.0956	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.758E-03	0.0029
Sr-90	1.775E-03	0.0008	6.488E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.808E-05	0.0000
U-234	1.652E-05	0.0000	3.474E-03	0.0015	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.760E-05	0.0000
U-235	2.978E-03	0.0013	3.188E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.567E-06	0.0000
U-238	6.226E-03	0.0027	3.322E-03	0.0014	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.806E-05	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	1.978E+00	0.8555	3.242E-01	0.1402	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.827E-03	0.0043

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.554E-02	0.0327
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.204E-02	0.0268
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.895E+00	0.8197
Pu-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	3.300E-02	0.0143
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.280E-01	0.0986
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.868E-03	0.0008
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	3.518E-03	0.0015
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	3.299E-03	0.0014
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	9.576E-03	0.0041
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	2.312E+00	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	9.401E-03	0.0043	6.222E-02	0.0282	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.890E-03	0.0009
Co-60	4.764E-02	0.0216	4.558E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.074E-07	0.0000
Cs-137	1.803E+00	0.8186	1.171E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.800E-05	0.0000
Pu-238	2.041E-05	0.0000	3.151E-02	0.0143	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.530E-04	0.0004
Pu-239	2.366E-04	0.0001	2.210E-01	0.1003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.756E-03	0.0031
Sr-90	1.666E-03	0.0008	6.088E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.635E-05	0.0000
U-234	1.631E-05	0.0000	3.427E-03	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.722E-05	0.0000
U-235	2.937E-03	0.0013	3.146E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.536E-06	0.0000
U-238	6.139E-03	0.0028	3.277E-03	0.0015	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.768E-05	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	1.871E+00	0.8495	3.218E-01	0.1461	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.751E-03	0.0044

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years
Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.351E-02	0.0334
Co-60	0.000E+00	0.0000	0.000E+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-02	0.0216
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.803E+00	0.8186
Pu-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	3.248E-02	0.0147
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.280E-01	0.1035
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.753E-03	0.0008
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	3.470E-03	0.0016
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	3.254E-03	0.0015
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	9.443E-03	0.0043
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	2.203E+00	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	8.548E-03	0.0046	5.657E-02	0.0301	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.719E-03	0.0009
Co-60	1.890E-02	0.0101	1.812E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.249E-08	0.0000
Cs-137	1.517E+00	0.8078	9.860E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.727E-05	0.0000
Pu-238	1.930E-05	0.0000	2.979E-02	0.0159	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.009E-04	0.0005
Pu-239	2.363E-04	0.0001	2.207E-01	0.1175	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.749E-03	0.0036
Sr-90	1.333E-03	0.0007	4.872E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.108E-05	0.0000
U-234	1.562E-05	0.0000	3.266E-03	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.594E-05	0.0000
U-235	2.798E-03	0.0015	3.008E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.435E-06	0.0000
U-238	5.843E-03	0.0031	3.123E-03	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.638E-05	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	1.555E+00	0.8278	3.138E-01	0.1671	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.502E-03	0.0051

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.684E-02	0.0356
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.890E-02	0.0101
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.517E+00	0.8078
Pu-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	3.071E-02	0.0163
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.277E-01	0.1212
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.402E-03	0.0007
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.308E-03	0.0018
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	3.101E-03	0.0017
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	8.992E-03	0.0048
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	1.878E+00	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	6.514E-03	0.0052	4.310E-02	0.0346	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.309E-03	0.0011
Co-60	1.344E-03	0.0011	1.300E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.917E-09	0.0000
Cs-137	9.249E-01	0.7432	6.037E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.506E-05	0.0000
Pu-238	1.644E-05	0.0000	2.537E-02	0.0204	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.674E-04	0.0006
Pu-239	2.353E-04	0.0002	2.201E-01	0.1768	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.729E-03	0.0054
Sr-90	7.041E-04	0.0006	2.578E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.116E-05	0.0000
U-234	1.423E-05	0.0000	2.847E-03	0.0023	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.262E-05	0.0000
U-235	2.437E-03	0.0020	2.661E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.182E-06	0.0000
U-238	5.068E-03	0.0041	2.721E-03	0.0022	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.299E-05	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	9.413E-01	0.7563	2.944E-01	0.2366	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.900E-03	0.0072

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

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.093E-02	0.0409
Co-60	0.000E+00	0.0000	0.000E+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-03	0.0011
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.250E-01	0.7432
Pu-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	2.615E-02	0.0210
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.270E-01	0.1824
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.410E-04	0.0006
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.884E-03	0.0023
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	2.705E-03	0.0022
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	7.813E-03	0.0063
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	1.245E+00	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	2.518E-03	0.0059	1.664E-02	0.0389	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.055E-04	0.0012
Co-60	1.260E-07	0.0000	1.285E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.848E-13	0.0000
Cs-137	1.608E-01	0.3754	1.084E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.298E-06	0.0000
Pu-238	9.375E-06	0.0000	1.447E-02	0.0338	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.377E-04	0.0010
Pu-239	2.304E-04	0.0005	2.178E-01	0.5084	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.659E-03	0.0155
Sr-90	7.469E-05	0.0002	2.778E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.202E-06	0.0000
U-234	1.395E-05	0.0000	1.763E-03	0.0041	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.400E-05	0.0000
U-235	1.493E-03	0.0035	1.781E-04	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.524E-06	0.0000
U-238	3.029E-03	0.0071	1.681E-03	0.0039	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.420E-05	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	1.682E-01	0.3926	2.525E-01	0.5896	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.639E-03	0.0178

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.966E-02	0.0459
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.260E-07	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.608E-01	0.3754
Pu-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	1.492E-02	0.0348
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.247E-01	0.5245
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.867E-05	0.0002
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.791E-03	0.0042
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	1.673E-03	0.0039
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.724E-03	0.0110
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	4.283E-01	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years
Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

0*Sum of all water independent and dependent pathways.

Dose/Source Ratios Summed Over All Pathways

Parent and Progeny Principal Radionuclide Contributions Indicated

0Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g)									
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03		
Am-241	Am-241	1.000E+00	1.074E-02	1.059E-02	1.031E-02	9.374E-03	7.142E-03	2.757E-03	0.000E+00	0.000E+00		
Am-241	Np-237	1.000E+00	7.323E-09	2.183E-08	5.021E-08	1.432E-07	3.614E-07	7.524E-07	0.000E+00	0.000E+00		
Am-241	U-233	1.000E+00	6.693E-16	4.659E-15	2.432E-14	2.081E-13	1.546E-12	1.102E-11	0.000E+00	0.000E+00		
Am-241	Th-229	1.000E+00	5.241E-19	7.829E-18	9.049E-17	2.320E-15	5.155E-14	1.331E-12	0.000E+00	0.000E+00		
Am-241	SDSR(j)		1.074E-02	1.059E-02	1.031E-02	9.375E-03	7.143E-03	2.758E-03	0.000E+00	0.000E+00		
0Co-60	Co-60	1.000E+00	4.425E-01	3.878E-01	2.977E-01	1.181E-01	8.400E-03	7.874E-07	0.000E+00	0.000E+00		
0Cs-137	Cs-137	1.000E+00	1.001E-01	9.766E-02	9.296E-02	7.820E-02	4.768E-02	8.288E-03	0.000E+00	0.000E+00		
0Pu-238	Pu-238	1.000E+00	8.297E-03	8.230E-03	8.099E-03	7.657E-03	6.522E-03	3.720E-03	0.000E+00	0.000E+00		
Pu-238	U-234	1.000E+00	3.886E-09	1.158E-08	2.663E-08	7.584E-08	1.898E-07	3.714E-07	0.000E+00	0.000E+00		
Pu-238	Th-230	1.000E+00	2.882E-14	2.009E-13	1.051E-12	9.087E-12	6.946E-11	5.404E-10	0.000E+00	0.000E+00		
Pu-238	Ra-226	1.000E+00	1.515E-16	2.262E-15	2.614E-14	6.697E-13	1.482E-11	3.673E-10	0.000E+00	0.000E+00		
Pu-238	Pb-210	1.000E+00	2.516E-21	7.729E-20	1.909E-18	1.389E-16	8.067E-15	5.007E-13	0.000E+00	0.000E+00		
Pu-238	Po-210	1.000E+00	2.319E-22	1.181E-20	4.357E-19	4.358E-17	2.868E-15	1.868E-13	0.000E+00	0.000E+00		
Pu-238	SDSR(j)		8.297E-03	8.230E-03	8.099E-03	7.657E-03	6.522E-03	3.720E-03	0.000E+00	0.000E+00		
0Pu-239	Pu-239	1.000E+00	9.122E-03	9.121E-03	9.118E-03	9.109E-03	9.081E-03	8.986E-03	0.000E+00	0.000E+00		
Pu-239	U-235	1.000E+00	1.289E-11	3.856E-11	8.935E-11	2.615E-10	7.084E-10	1.837E-09	0.000E+00	0.000E+00		
Pu-239	Pa-231	1.000E+00	1.147E-16	8.001E-16	4.197E-15	3.652E-14	2.846E-13	2.356E-12	0.000E+00	0.000E+00		
Pu-239	Ac-227	1.000E+00	5.511E-18	8.169E-17	9.282E-16	2.241E-14	4.244E-13	7.103E-12	0.000E+00	0.000E+00		
Pu-239	SDSR(j)		9.122E-03	9.121E-03	9.118E-03	9.109E-03	9.081E-03	8.986E-03	0.000E+00	0.000E+00		
0Sr-90	Sr-90	1.000E+00	7.654E-04	7.414E-04	6.956E-04	5.565E-04	2.941E-04	3.122E-05	0.000E+00	0.000E+00		
0U-234	U-234	1.000E+00	2.746E-03	2.727E-03	2.690E-03	2.563E-03	2.234E-03	1.379E-03	0.000E+00	0.000E+00		
U-234	Th-230	1.000E+00	3.054E-08	9.133E-08	2.117E-07	6.200E-07	1.684E-06	4.437E-06	0.000E+00	0.000E+00		
U-234	Ra-226	1.000E+00	2.139E-10	1.493E-09	7.831E-09	6.819E-08	5.317E-07	4.323E-06	0.000E+00	0.000E+00		
U-234	Pb-210	1.000E+00	4.436E-15	6.592E-14	7.530E-13	1.852E-11	3.680E-10	6.933E-09	0.000E+00	0.000E+00		
U-234	Po-210	1.000E+00	4.728E-16	1.148E-14	1.897E-13	6.079E-12	1.331E-10	2.601E-09	0.000E+00	0.000E+00		
U-234	SDSR(j)		2.746E-03	2.727E-03	2.690E-03	2.564E-03	2.236E-03	1.388E-03	0.000E+00	0.000E+00		
0U-235	U-235	1.000E+00	2.616E-02	2.598E-02	2.562E-02	2.441E-02	2.125E-02	1.299E-02	0.000E+00	0.000E+00		
U-235	Pa-231	1.000E+00	3.490E-07	1.042E-06	2.403E-06	6.918E-06	1.787E-05	3.897E-05	0.000E+00	0.000E+00		
U-235	Ac-227	1.000E+00	2.232E-08	1.538E-07	7.845E-07	6.192E-06	3.717E-05	1.476E-04	0.000E+00	0.000E+00		
U-235	SDSR(j)		2.616E-02	2.598E-02	2.562E-02	2.442E-02	2.130E-02	1.317E-02	0.000E+00	0.000E+00		
0U-238	U-238	1.000E+00	6.988E-03	6.939E-03	6.843E-03	6.516E-03	5.661E-03	3.423E-03	0.000E+00	0.000E+00		
U-238	U-234	1.000E+00	3.888E-09	1.159E-08	2.669E-08	7.630E-08	1.931E-07	3.930E-07	0.000E+00	0.000E+00		
U-238	Th-230	1.000E+00	2.882E-14	2.010E-13	1.053E-12	9.123E-12	7.025E-11	5.599E-10	0.000E+00	0.000E+00		
U-238	Ra-226	1.000E+00	1.515E-16	2.263E-15	2.617E-14	6.717E-13	1.495E-11	3.773E-10	0.000E+00	0.000E+00		
U-238	Pb-210	1.000E+00	2.516E-21	7.732E-20	1.911E-18	1.393E-16	8.123E-15	5.125E-13	0.000E+00	0.000E+00		
U-238	Po-210	1.000E+00	2.320E-22	1.181E-20	4.360E-19	4.368E-17	2.888E-15	1.912E-13	0.000E+00	0.000E+00		
U-238	SDSR(j)		6.988E-03	6.939E-03	6.843E-03	6.516E-03	5.661E-03	3.424E-03	0.000E+00	0.000E+00		

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*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
\$ is used to indicate summation; the Greek sigma is not included in this font.
The DSR includes contributions from associated (half-life <= 30 days) daughters.

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

ONuclide (i)	t= 0.000E+00 1.000E+00 3.000E+00 1.000E+01 3.000E+01 1.000E+02						3.000E+02 1.000E+03 3.000E+03 9.065E+03 3.424E+12 3.424E+12					
	2.328E+03	2.360E+03	2.425E+03	2.667E+03	3.500E+03	3.500E+03	3.424E+12	3.424E+12	3.424E+12	3.424E+12	3.424E+12	3.424E+12
Am-241	5.649E+01	6.447E+01	8.396E+01	2.117E+02	2.976E+02	2.976E+02	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15
Co-60	2.497E+02	2.560E+02	2.689E+02	3.197E+02	5.243E+02	5.243E+02	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13
Cs-137	3.013E+03	3.038E+03	3.087E+03	3.265E+03	3.833E+03	3.833E+03	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13
Pu-238	2.741E+03	2.741E+03	2.742E+03	2.745E+03	2.753E+03	2.753E+03	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10
Pu-239	3.266E+04	3.372E+04	3.594E+04	4.492E+04	8.502E+04	8.502E+04	*1.365E+14	*1.365E+14	*1.365E+14	*1.365E+14	*1.365E+14	*1.365E+14
Sr-90	9.104E+03	9.167E+03	9.293E+03	9.750E+03	1.118E+04	1.118E+04	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09
U-234	9.558E+02	9.624E+02	9.757E+02	1.024E+03	1.174E+03	1.174E+03	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06
U-235	3.578E+03	3.603E+03	3.653E+03	3.837E+03	4.416E+03	4.416E+03	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05
U-238	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
*At specific activity limit	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====

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

ONuclide	Initial (i)	(pCi/g)	tmin (years)	DSR(i,tmin) (pCi/g)	G(i,tmin) (pCi/g)	DSR(i,tmax) (pCi/g)	G(i,tmax) (pCi/g)
Am-241	7.130E+00	0.000E+00	1.074E-02	2.328E+03	1.074E-02	2.328E+03	2.328E+03
Co-60	1.600E-01	0.000E+00	4.425E-01	5.649E+01	4.425E-01	5.649E+01	5.649E+01
Cs-137	1.940E+01	0.000E+00	1.001E-01	2.497E+02	1.001E-01	2.497E+02	2.497E+02
Pu-238	4.010E+00	0.000E+00	8.297E-03	3.013E+03	8.297E-03	3.013E+03	3.013E+03
Pu-239	2.500E+01	0.000E+00	9.122E-03	2.741E+03	9.122E-03	2.741E+03	2.741E+03
Sr-90	2.520E+00	0.000E+00	7.654E-04	3.266E+04	7.654E-04	3.266E+04	3.266E+04
U-234	1.290E+00	0.000E+00	2.746E-03	9.104E+03	2.746E-03	9.104E+03	9.104E+03
U-235	1.270E-01	0.000E+00	2.616E-02	9.558E+02	2.616E-02	9.558E+02	9.558E+02
U-238	1.380E+00	0.000E+00	6.988E-03	3.578E+03	6.988E-03	3.578E+03	3.578E+03
=====	=====	=====	=====	=====	=====	=====	=====

Individual Nuclide Dose Summed Over All Pathways

Parent Nuclide and Branch Fraction Indicated		DOSE(j,t), mrem/yr								
ONuclide (j)	Parent (i)	BRF(i)	t=							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02 3.000E+02 1.000E+03		
Am-241	Am-241	1.000E+00	7.658E-02	7.554E-02	7.351E-02	6.684E-02	5.093E-02	1.966E-02	0.000E+00	0.000E+00
	Am-241	1.000E+00	5.221E-08	1.556E-07	3.580E-07	1.021E-06	2.577E-06	5.364E-06	0.000E+00	0.000E+00
	Am-241	1.000E+00	4.772E-15	3.322E-14	1.734E-13	1.484E-12	1.103E-11	7.857E-11	0.000E+00	0.000E+00
Am-241	Am-241	1.000E+00	3.737E-18	5.582E-17	6.452E-16	1.654E-14	3.675E-13	9.488E-12	0.000E+00	0.000E+00
	Co-60	1.000E+00	7.080E-02	6.204E-02	4.764E-02	1.890E-02	1.344E-03	1.260E-07	0.000E+00	0.000E+00
	Co-60	1.000E+00	1.942E+00	1.895E+00	1.803E+00	1.517E+00	9.250E-01	1.608E-01	0.000E+00	0.000E+00
Pu-238	Pu-238	1.000E+00	3.327E-02	3.300E-02	3.248E-02	3.071E-02	2.615E-02	1.492E-02	0.000E+00	0.000E+00
	Pu-238	1.000E+00	1.558E-08	4.645E-08	1.068E-07	3.041E-07	7.612E-07	1.489E-06	0.000E+00	0.000E+00
	Pu-234	1.000E+00	3.542E-03	3.518E-03	3.470E-03	3.307E-03	2.881E-03	1.779E-03	0.000E+00	0.000E+00
U-238	U-238	1.000E+00	5.365E-09	1.600E-08	3.683E-08	1.053E-07	2.665E-07	5.424E-07	0.000E+00	0.000E+00
	U-234	1.000E+00	3.542E-03	3.518E-03	3.470E-03	3.307E-03	2.882E-03	1.781E-03	0.000E+00	0.000E+00
	Th-230	1.000E+00	1.155E-13	8.054E-13	4.216E-12	3.644E-11	2.785E-10	2.167E-09	0.000E+00	0.000E+00
Th-230	Th-230	1.000E+00	3.939E-08	1.178E-07	2.730E-07	7.998E-07	2.172E-06	5.723E-06	0.000E+00	0.000E+00
	Th-230	1.000E+00	3.978E-14	2.773E-13	1.453E-12	1.259E-11	9.695E-11	7.726E-10	0.000E+00	0.000E+00
	Th-230	1.000E+00	3.939E-08	1.178E-07	2.731E-07	7.998E-07	2.172E-06	5.726E-06	0.000E+00	0.000E+00
Ra-226	Th-230	1.000E+00	6.074E-16	9.072E-15	1.048E-13	2.686E-12	5.942E-11	1.473E-09	0.000E+00	0.000E+00
	Ra-226	1.000E+00	2.760E-10	1.926E-09	1.010E-08	8.796E-08	6.859E-07	5.577E-06	0.000E+00	0.000E+00
	Ra-226	1.000E+00	2.091E-16	3.124E-15	3.612E-14	9.270E-13	2.063E-11	5.207E-10	0.000E+00	0.000E+00
Ra-226	Ra-226	1.000E+00	2.760E-10	1.926E-09	1.010E-08	8.796E-08	6.860E-07	5.579E-06	0.000E+00	0.000E+00
	Pb-210	1.000E+00	1.009E-20	3.099E-19	7.655E-18	5.571E-16	3.235E-14	2.008E-12	0.000E+00	0.000E+00
	Pb-210	1.000E+00	5.722E-15	8.503E-14	9.714E-13	2.389E-11	4.748E-10	8.943E-09	0.000E+00	0.000E+00
Pb-210	Pb-210	1.000E+00	3.473E-21	1.067E-19	2.637E-18	1.922E-16	1.121E-14	7.073E-13	0.000E+00	0.000E+00
	Pb-210	1.000E+00	5.722E-15	8.503E-14	9.714E-13	2.389E-11	4.748E-10	8.946E-09	0.000E+00	0.000E+00
	Pb-210	1.000E+00	9.301E-22	4.734E-20	1.747E-18	1.748E-16	1.150E-14	7.492E-13	0.000E+00	0.000E+00
Po-210	Po-210	1.000E+00	6.100E-16	1.481E-14	2.448E-13	7.841E-12	1.717E-10	3.355E-09	0.000E+00	0.000E+00
	Po-210	1.000E+00	3.201E-22	1.630E-20	6.017E-19	6.028E-17	3.986E-15	2.639E-13	0.000E+00	0.000E+00
	Po-210	1.000E+00	6.100E-16	1.481E-14	2.448E-13	7.842E-12	1.718E-10	3.356E-09	0.000E+00	0.000E+00
Pu-239	Pu-239	1.000E+00	2.281E-01	2.280E-01	2.280E-01	2.277E-01	2.270E-01	2.247E-01	0.000E+00	0.000E+00
	Pu-239	1.000E+00	3.224E-10	9.640E-10	2.234E-09	6.538E-09	1.771E-08	4.594E-08	0.000E+00	0.000E+00
	U-235	1.000E+00	3.322E-03	3.299E-03	3.254E-03	3.100E-03	2.698E-03	1.649E-03	0.000E+00	0.000E+00
U-235	U-235	1.000E+00	3.322E-03	3.299E-03	3.254E-03	3.100E-03	2.698E-03	1.649E-03	0.000E+00	0.000E+00
	Pa-231	1.000E+00	2.867E-15	2.000E-14	1.049E-13	9.131E-13	7.116E-12	5.889E-11	0.000E+00	0.000E+00
	Pa-231	1.000E+00	4.433E-08	1.323E-07	3.051E-07	8.786E-07	2.269E-06	4.950E-06	0.000E+00	0.000E+00
Pa-231	Pa-231	1.000E+00	4.433E-08	1.323E-07	3.051E-07	8.786E-07	2.269E-06	4.950E-06	0.000E+00	0.000E+00

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

ONuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr									
			t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	Pu-239	1.000E+00	1.378E-16	2.042E-15	2.320E-14	5.601E-13	1.061E-11	1.776E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ac-227	U-235	1.000E+00	2.835E-09	1.953E-08	9.963E-08	7.863E-07	4.720E-06	1.874E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ac-227	\$DOSE(j)		2.835E-09	1.953E-08	9.963E-08	7.863E-07	4.720E-06	1.874E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00
OSr-90	Sr-90	1.000E+00	1.929E-03	1.868E-03	1.753E-03	1.402E-03	7.410E-04	7.867E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00
OU-238	U-238	1.000E+00	9.643E-03	9.576E-03	9.443E-03	8.992E-03	7.812E-03	4.724E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====

BRF(i) is the branch fraction of the parent nuclide.
\$ is used to indicate summation; the Greek sigma is not included in this font.

Individual Nuclide Soil Concentration													
Parent		S(j,t), pCi/g											
ONuclide	Parent (i)	BRF(i)	Parent Nuclide and Branch Fraction Indicated										
(j)	(i)		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
Am-241	Am-241	1.000E+00	7.130E+00	7.034E+00	6.845E+00	6.224E+00	4.742E+00	1.831E+00	1.207E-01	8.870E-06			
Am-237	Am-241	1.000E+00	0.000E+00	2.293E-06	6.779E-06	2.149E-05	5.604E-05	1.192E-04	1.345E-04	7.124E-05			
U-233	Am-241	1.000E+00	0.000E+00	5.017E-12	4.458E-11	4.736E-10	3.756E-09	2.739E-08	8.671E-08	7.772E-08			
Th-229	Am-241	1.000E+00	0.000E+00	1.591E-16	4.253E-15	1.523E-13	3.739E-12	1.009E-10	1.250E-09	7.172E-09			
Co-60	Co-60	1.000E+00	1.600E-01	1.403E-01	1.078E-01	4.285E-02	3.074E-03	3.038E-07	1.095E-18	0.000E+00			
Co-137	Cs-137	1.000E+00	1.940E+01	1.893E+01	1.802E+01	1.518E+01	9.295E+00	1.669E+00	1.236E-02	4.319E-10			
Pu-238	Pu-238	1.000E+00	4.010E+00	3.978E+00	3.915E+00	3.701E+00	3.152E+00	1.798E+00	3.615E-01	1.317E-03			
Pu-234	Pu-238	1.000E+00	0.000E+00	1.128E-05	3.335E-05	1.055E-04	2.727E-04	5.398E-04	3.663E-04	6.946E-06			
U-234	U-234	1.000E+00	1.290E+00	1.281E+00	1.264E+00	1.204E+00	1.049E+00	6.479E-01	1.635E-01	1.319E-03			
U-234	U-238	1.000E+00	0.000E+00	3.885E-06	1.150E-05	3.652E-05	9.547E-05	1.965E-04	1.488E-04	4.005E-06			
U-234	SS(j) :	1.000E+00	1.290E+00	1.281E+00	1.264E+00	1.204E+00	1.050E+00	6.487E-01	1.640E-01	1.330E-03			
Th-230	Pu-238	1.000E+00	0.000E+00	5.091E-11	4.537E-10	4.869E-09	3.972E-08	3.162E-07	1.205E-06	1.826E-06			
Th-230	U-234	1.000E+00	0.000E+00	1.157E-05	3.448E-05	1.122E-04	3.147E-04	8.387E-04	1.469E-03	1.666E-03			
Th-230	U-238	1.000E+00	0.000E+00	1.753E-11	1.563E-10	1.682E-09	1.382E-08	1.127E-07	4.535E-07	7.302E-07			
Th-230	SS(j) :	1.000E+00	0.000E+00	1.157E-05	3.448E-05	1.122E-04	3.147E-04	8.392E-04	1.471E-03	1.669E-03			
Th-230	SS(j) :	1.000E+00	0.000E+00	7.354E-15	1.967E-13	7.050E-12	1.734E-10	4.663E-09	5.329E-08	1.880E-07			
Ra-226	Pu-238	1.000E+00	0.000E+00	2.506E-09	2.240E-08	2.427E-07	2.034E-06	1.773E-05	8.424E-05	1.780E-04			
Ra-226	U-234	1.000E+00	0.000E+00	2.532E-15	6.775E-14	2.433E-12	6.018E-11	1.648E-09	1.968E-08	7.451E-08			
Ra-226	SS(j) :	1.000E+00	0.000E+00	2.506E-09	2.240E-08	2.427E-07	2.034E-06	1.774E-05	8.431E-05	1.782E-04			
Ra-226	Pu-238	1.000E+00	0.000E+00	5.682E-17	4.508E-15	5.177E-13	3.432E-11	2.232E-09	4.107E-08	1.725E-07			
Pb-210	U-234	1.000E+00	0.000E+00	2.578E-11	6.808E-10	2.337E-08	5.124E-07	9.992E-06	6.922E-05	1.642E-04			
Pb-210	U-238	1.000E+00	0.000E+00	1.956E-17	1.552E-15	1.786E-13	1.189E-11	7.863E-10	1.510E-08	6.830E-08			
Pb-210	SS(j) :	1.000E+00	0.000E+00	2.578E-11	6.808E-10	2.337E-08	5.124E-07	9.995E-06	6.927E-05	1.644E-04			
Pb-210	Pu-238	1.000E+00	0.000E+00	1.577E-17	2.473E-15	4.187E-13	3.173E-11	2.167E-09	4.039E-08	1.703E-07			
Po-210	U-234	1.000E+00	0.000E+00	8.495E-12	4.180E-10	1.981E-08	4.820E-07	9.749E-06	6.817E-05	1.621E-04			
Po-210	U-238	1.000E+00	0.000E+00	5.427E-18	8.516E-16	1.444E-13	1.099E-11	7.631E-10	1.485E-08	6.741E-08			
Po-210	SS(j) :	1.000E+00	0.000E+00	8.495E-12	4.180E-10	1.982E-08	4.820E-07	9.752E-06	6.823E-05	1.623E-04			
Pu-239	Pu-239	1.000E+00	2.500E+01	2.499E+01	2.496E+01	2.489E+01	2.463E+01	2.390E+01	2.152E+01				
U-235	Pu-239	1.000E+00	0.000E+00	2.454E-08	7.309E-08	2.378E-07	6.658E-07	1.765E-06	3.032E-06	3.144E-06			
U-235	U-235	1.000E+00	1.270E-01	1.261E-01	1.244E-01	1.186E-01	1.033E-01	6.381E-02	1.611E-02	1.302E-04			
U-235	SS(j) :	1.000E+00	1.270E-01	1.261E-01	1.244E-01	1.186E-01	1.033E-01	6.381E-02	1.611E-02	1.333E-04			
Pa-231	Pu-239	1.000E+00	0.000E+00	2.594E-13	2.317E-12	2.504E-11	2.084E-10	1.771E-09	7.842E-09	1.379E-08			
Pa-231	U-235	1.000E+00	0.000E+00	2.671E-06	7.921E-06	2.534E-05	6.762E-05	1.497E-04	1.409E-04	9.009E-06			
Pa-231	SS(j) :	1.000E+00	0.000E+00	2.671E-06	7.921E-06	2.534E-05	6.762E-05	1.497E-04	1.409E-04	9.023E-06			

Individual Nuclide Soil Concentration										
Parent Nuclide and Branch Fraction Indicated			S(j,t), pCi/g							
ONuclide (j)	Parent (i)	BRF(i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	Pu-239	1.000E+00	0.000E+00	2.726E-15	7.160E-14	2.412E-12	5.042E-11	8.770E-10	5.238E-09	1.002E-08
Ac-227	U-235	1.000E+00	0.000E+00	4.199E-08	3.643E-07	3.568E-06	2.285E-05	9.318E-05	1.075E-04	7.296E-06
Ac-227	SS(j):		0.000E+00	4.199E-08	3.643E-07	3.568E-06	2.285E-05	9.318E-05	1.076E-04	7.306E-06
OSr-90	Sr-90	1.000E+00	2.520E+00	2.441E+00	2.291E+00	1.833E+00	9.699E-01	1.045E-01	1.798E-04	3.798E-14
OU-238	U-238	1.000E+00	1.380E+00	1.371E+00	1.352E+00	1.288E+00	1.123E+00	6.934E-01	1.750E-01	1.415E-03

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

S is used to indicate summation; the Greek sigma is not included in this font.

0RESALC.EXE execution time =   2.75 seconds

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Exhibit 3

RESRAD Scenario CAS 10-09-02 Hot Spot 10m²

(27 Pages)

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines
=====

Dose Conversion Factor (and Related) Parameter Summary ...	2
Site-Specific Parameter Summary	6
Summary of Pathway Selections	12
Contaminated Zone and Total Dose Summary	13
Total Dose Components	
Time = 0.000E+00	14
Time = 1.000E+00	15
Time = 3.000E+00	16
Time = 1.000E+01	17
Time = 3.000E+01	18
Time = 1.000E+02	19
Time = 3.000E+02	20
Time = 1.000E+03	21
Dose/Source Ratios Summed Over All Pathways	22
Single Radionuclide Soil Guidelines	23
Dose Per Nuclide Summed Over All Pathways	24
Soil Concentration Per Nuclide	26

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	Am-241	4.440E-01	4.440E-01	DCF2 (2)
B-1	Co-60	2.190E-04	2.190E-04	DCF2 (3)
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2 (4)
B-1	Np-237+D	5.400E-01	5.400E-01	DCF2 (5)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2 (6)
B-1	Pb-210+D	1.380E-02	1.380E-02	DCF2 (7)
B-1	Po-210	9.400E-03	9.400E-03	DCF2 (8)
B-1	Pu-238	3.920E-01	3.920E-01	DCF2 (9)
B-1	Pu-239	4.290E-01	4.290E-01	DCF2 (10)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2 (11)
B-1	Sr-90+D	1.310E-03	1.310E-03	DCF2 (12)
B-1	Th-229+D	2.160E+00	2.160E+00	DCF2 (13)
B-1	Th-230	3.260E-01	3.260E-01	DCF2 (14)
B-1	U-233	1.350E-01	1.350E-01	DCF2 (15)
B-1	U-234	1.320E-01	1.320E-01	DCF2 (16)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2 (17)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2 (18)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3 (1)
D-1	Am-241	3.640E-03	3.640E-03	DCF3 (2)
D-1	Co-60	2.690E-05	2.690E-05	DCF3 (3)
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3 (4)
D-1	Np-237+D	4.440E-03	4.440E-03	DCF3 (5)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3 (6)
D-1	Pb-210+D	5.370E-03	5.370E-03	DCF3 (7)
D-1	Po-210	1.900E-03	1.900E-03	DCF3 (8)
D-1	Pu-238	3.200E-03	3.200E-03	DCF3 (9)
D-1	Pu-239	3.540E-03	3.540E-03	DCF3 (10)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3 (11)
D-1	Sr-90+D	1.530E-04	1.530E-04	DCF3 (12)
D-1	Th-229+D	4.030E-03	4.030E-03	DCF3 (13)
D-1	Th-230	5.480E-04	5.480E-04	DCF3 (14)
D-1	U-233	2.890E-04	2.890E-04	DCF3 (15)
D-1	U-234	2.830E-04	2.830E-04	DCF3 (16)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3 (17)
D-1	U-238+D	2.690E-04	2.690E-04	DCF3 (18)
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	Am-241 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (2,1)
D-34	Am-241 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-05	5.000E-05	RTF (2,2)
D-34	Am-241 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-06	2.000E-06	RTF (2,3)

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

File: FGR 13 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF (3,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF (3,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF (3,3)
D-34				
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF (4,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF (4,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF (4,3)
D-34				
D-34	Np-237+D , plant/soil concentration ratio, dimensionless	2.000E-02	2.000E-02	RTF (5,1)
D-34	Np-237+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF (5,2)
D-34	Np-237+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF (5,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF (6,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF (6,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF (6,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF (7,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF (7,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF (7,3)
D-34				
D-34	Po-210 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (8,1)
D-34	Po-210 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF (8,2)
D-34	Po-210 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.400E-04	3.400E-04	RTF (8,3)
D-34				
D-34	Pu-238 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (9,1)
D-34	Pu-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF (9,2)
D-34	Pu-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF (9,3)
D-34				
D-34	Pu-239 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(10,1)
D-34	Pu-239 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(10,2)
D-34	Pu-239 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(10,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(11,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(11,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(11,3)
D-34				
D-34	Sr-90+D , plant/soil concentration ratio, dimensionless	3.000E-01	3.000E-01	RTF(12,1)
D-34	Sr-90+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-03	8.000E-03	RTF(12,2)
D-34	Sr-90+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(12,3)
D-34				
D-34	Th-229+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(13,1)
D-34	Th-229+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(13,2)
D-34	Th-229+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(13,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(14,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(14,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(14,3)
D-34				
D-34	U-233 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(15,1)
D-34	U-233 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(15,2)
D-34	U-233 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(15,3)

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

File: FGR 13 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
0				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(16,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(16,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(16,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(17,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(17,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(17,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(18,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(18,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(18,3)
D-5				
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	Am-241 , fish	3.000E+01	3.000E+01	BIOFAC(2,1)
D-5	Am-241 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(2,2)
D-5				
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(3,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(3,2)
D-5				
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(4,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(4,2)
D-5				
D-5	Np-237+D , fish	3.000E+01	3.000E+01	BIOFAC(5,1)
D-5	Np-237+D , crustacea and mollusks	4.000E+02	4.000E+02	BIOFAC(5,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(6,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(6,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(7,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(7,2)
D-5				
D-5	Po-210 , fish	1.000E+02	1.000E+02	BIOFAC(8,1)
D-5	Po-210 , crustacea and mollusks	2.000E+04	2.000E+04	BIOFAC(8,2)
D-5				
D-5	Pu-238 , fish	3.000E+01	3.000E+01	BIOFAC(9,1)
D-5	Pu-238 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(9,2)
D-5				
D-5	Pu-239 , fish	3.000E+01	3.000E+01	BIOFAC(10,1)
D-5	Pu-239 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(10,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(11,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(11,2)
D-5				
D-5	Sr-90+D , fish	6.000E+01	6.000E+01	BIOFAC(12,1)
D-5	Sr-90+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(12,2)
D-5				
D-5	Th-229+D , fish	1.000E+02	1.000E+02	BIOFAC(13,1)
D-5	Th-229+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(13,2)

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

File: FGR 13 Morbidity

0	Menu	Parameter	Current Value	Default	Parameter Name
D-5	Th-230	, fish	1.000E+02	1.000E+02	BIOFAC (14,1)
D-5	Th-230	, crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC (14,2)
D-5	U-233	, fish	1.000E+01	1.000E+01	BIOFAC (15,1)
D-5	U-233	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC (15,2)
D-5	U-234	, fish	1.000E+01	1.000E+01	BIOFAC (16,1)
D-5	U-234	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC (16,2)
D-5	U-235+D	, fish	1.000E+01	1.000E+01	BIOFAC (17,1)
D-5	U-235+D	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC (17,2)
D-5	U-238+D	, fish	1.000E+01	1.000E+01	BIOFAC (18,1)
D-5	U-238+D	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC (18,2)
=====					

Site-Specific Parameter Summary						
	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
0						
Menu						
R011	Area of contaminated zone (m**2)	1.000E+01	1.000E+04		---	AREA
R011	Thickness of contaminated zone (m)	3.000E-01	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	2.500E+01		---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00		---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00		---	T (2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00		---	T (3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01		---	T (4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01		---	T (5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02		---	T (6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02		---	T (7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03		---	T (8)
R011	Times for calculations (yr)	not used	0.000E+00		---	T (9)
R011	Times for calculations (yr)	not used	0.000E+00		---	T(10)
R012	Initial principal radionuclide (pCi/g): Am-241	7.130E+00	0.000E+00		---	S1 (2)
R012	Initial principal radionuclide (pCi/g): Co-60	1.600E-01	0.000E+00		---	S1 (3)
R012	Initial principal radionuclide (pCi/g): Cs-137	1.940E+01	0.000E+00		---	S1 (4)
R012	Initial principal radionuclide (pCi/g): Pu-238	4.010E+00	0.000E+00		---	S1 (9)
R012	Initial principal radionuclide (pCi/g): Pu-239	2.500E+01	0.000E+00		---	S1(10)
R012	Initial principal radionuclide (pCi/g): Sr-90	2.520E+00	0.000E+00		---	S1(12)
R012	Initial principal radionuclide (pCi/g): U-234	1.290E+00	0.000E+00		---	S1(16)
R012	Initial principal radionuclide (pCi/g): U-235	1.270E-01	0.000E+00		---	S1(17)
R012	Initial principal radionuclide (pCi/g): U-238	1.380E+00	0.000E+00		---	S1(18)
R012	Concentration in groundwater (pCi/L): Am-241	not used	0.000E+00		---	W1 (2)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00		---	W1 (3)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00		---	W1 (4)
R012	Concentration in groundwater (pCi/L): Pu-238	not used	0.000E+00		---	W1 (9)
R012	Concentration in groundwater (pCi/L): Pu-239	not used	0.000E+00		---	W1(10)
R012	Concentration in groundwater (pCi/L): Sr-90	not used	0.000E+00		---	W1(12)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00		---	W1(16)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00		---	W1(17)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00		---	W1(18)
R013	Cover depth (m)	0.000E+00	0.000E+00		---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00		---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03		---	VCV
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00		---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03		---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01		---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01		---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01		---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00		---	BCZ
R013	Average annual wind speed (m/sec)	3.500E+00	2.000E+00		---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00		---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01		---	EVAPTR
R013	Precipitation (m/yr)	3.000E-02	1.000E+00		---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01		---	RI
R013	Irrigation mode	overhead	overhead		---	IDITCH
R013	Runoff coefficient	4.000E-01	2.000E-01		---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06		---	WAREA

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
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
R015		Unsat. zone 1, thickness (m)	not used	4.000E+00		---	H(1)
R015		Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00		---	DENSUZ(1)
R015		Unsat. zone 1, total porosity	not used	4.000E-01		---	TPUZ(1)
R015		Unsat. zone 1, effective porosity	not used	2.000E-01		---	EPUZ(1)
R015		Unsat. zone 1, field capacity	not used	2.000E-01		---	FCUZ(1)
R015		Unsat. zone 1, soil-specific b parameter	not used	5.300E+00		---	BUZ(1)
R015		Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01		---	HCUZ(1)
R016		Distribution coefficients for Am-241					
R016		Contaminated zone (cm**3/g)	2.000E+01	2.000E+01		---	DCNUCC(2)
R016		Unsat. zone 1 (cm**3/g)	not used	2.000E+01		---	DCNUCU(2,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+01		---	DCNUCS(2)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.200E-02 not used	ALEACH(2)
R016		Solubility constant	0.000E+00	0.000E+00			SOLUBK(2)
R016		Distribution coefficients for Co-60					
R016		Contaminated zone (cm**3/g)	1.000E+03	1.000E+03		---	DCNUCC(3)
R016		Unsat. zone 1 (cm**3/g)	not used	1.000E+03		---	DCNUCU(3,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+03		---	DCNUCS(3)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		2.422E-04 not used	ALEACH(3)
R016		Solubility constant	0.000E+00	0.000E+00			SOLUBK(3)
R016		Distribution coefficients for Cs-137					
R016		Contaminated zone (cm**3/g)	1.700E+02	1.000E+03		---	DCNUCC(4)
R016		Unsat. zone 1 (cm**3/g)	not used	1.000E+03		---	DCNUCU(4,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+03		---	DCNUCS(4)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.423E-03 not used	ALEACH(4)
R016		Solubility constant	0.000E+00	0.000E+00			SOLUBK(4)
R016		Distribution coefficients for Pu-238					
R016		Contaminated zone (cm**3/g)	2.000E+03	2.000E+03		---	DCNUCC(9)
R016		Unsat. zone 1 (cm**3/g)	not used	2.000E+03		---	DCNUCU(9,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+03		---	DCNUCS(9)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.211E-04 not used	ALEACH(9)
R016		Solubility constant	0.000E+00	0.000E+00			SOLUBK(9)

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
		Distribution coefficients for Pu-239					
R016		Contaminated zone (cm**3/g)	2.000E+03	2.000E+03		---	DCNUCC (10)
R016		Unsaturated zone 1 (cm**3/g)	not used	2.000E+03		---	DCNUCU (10,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+03		---	DCNUCS (10)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.211E-04	ALEACH (10)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (10)
		Distribution coefficients for Sr-90					
R016		Contaminated zone (cm**3/g)	3.000E+01	3.000E+01		---	DCNUCC (12)
R016		Unsaturated zone 1 (cm**3/g)	not used	3.000E+01		---	DCNUCU (12,1)
R016		Saturated zone (cm**3/g)	not used	3.000E+01		---	DCNUCS (12)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		8.023E-03	ALEACH (12)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (12)
		Distribution coefficients for U-234					
R016		Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC (16)
R016		Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (16,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (16)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		6.883E-03	ALEACH (16)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (16)
		Distribution coefficients for U-235					
R016		Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC (17)
R016		Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (17,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (17)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		6.883E-03	ALEACH (17)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (17)
		Distribution coefficients for U-238					
R016		Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC (18)
R016		Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (18,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (18)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		6.883E-03	ALEACH (18)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (18)
		Distribution coefficients for daughter Ac-227					
R016		Contaminated zone (cm**3/g)	2.000E+01	2.000E+01		---	DCNUCC (1)
R016		Unsaturated zone 1 (cm**3/g)	not used	2.000E+01		---	DCNUCU (1,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+01		---	DCNUCS (1)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.200E-02	ALEACH (1)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (1)
		Distribution coefficients for daughter Np-237					
R016		Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00		2.574E+02	DCNUCC (5)
R016		Unsaturated zone 1 (cm**3/g)	not used	-1.000E+00		---	DCNUCU (5,1)
R016		Saturated zone (cm**3/g)	not used	-1.000E+00		---	DCNUCS (5)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		9.402E-04	ALEACH (5)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (5)

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
		Distribution coefficients for daughter Pa-231					
R016		Contaminated zone (cm**3/g)	5.000E+01	5.000E+01		---	DCNUCC (6)
R016		Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (6,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (6)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		4.826E-03	ALEACH (6)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (6)
		Distribution coefficients for daughter Pb-210					
R016		Contaminated zone (cm**3/g)	1.000E+02	1.000E+02		---	DCNUCC (7)
R016		Unsaturated zone 1 (cm**3/g)	not used	1.000E+02		---	DCNUCU (7,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+02		---	DCNUCS (7)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		2.418E-03	ALEACH (7)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (7)
		Distribution coefficients for daughter Po-210					
R016		Contaminated zone (cm**3/g)	1.000E+01	1.000E+01		---	DCNUCC (8)
R016		Unsaturated zone 1 (cm**3/g)	not used	1.000E+01		---	DCNUCU (8,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+01		---	DCNUCS (8)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		2.377E-02	ALEACH (8)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (8)
		Distribution coefficients for daughter Ra-226					
R016		Contaminated zone (cm**3/g)	7.000E+01	7.000E+01		---	DCNUCC (11)
R016		Unsaturated zone 1 (cm**3/g)	not used	7.000E+01		---	DCNUCU (11,1)
R016		Saturated zone (cm**3/g)	not used	7.000E+01		---	DCNUCS (11)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		3.451E-03	ALEACH (11)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (11)
		Distribution coefficients for daughter Th-229					
R016		Contaminated zone (cm**3/g)	6.000E+04	6.000E+04		---	DCNUCC (13)
R016		Unsaturated zone 1 (cm**3/g)	not used	6.000E+04		---	DCNUCU (13,1)
R016		Saturated zone (cm**3/g)	not used	6.000E+04		---	DCNUCS (13)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		4.037E-06	ALEACH (13)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (13)
		Distribution coefficients for daughter Th-230					
R016		Contaminated zone (cm**3/g)	6.000E+04	6.000E+04		---	DCNUCC (14)
R016		Unsaturated zone 1 (cm**3/g)	not used	6.000E+04		---	DCNUCU (14,1)
R016		Saturated zone (cm**3/g)	not used	6.000E+04		---	DCNUCS (14)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		4.037E-06	ALEACH (14)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (14)
		Distribution coefficients for daughter U-233					
R016		Contaminated zone (cm**3/g)	5.000E+01	5.000E+01		---	DCNUCC (15)
R016		Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (15,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (15)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		4.826E-03	ALEACH (15)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (15)
R017		Inhalation rate (m**3/yr)	1.230E+04	8.400E+03		---	INHALR
R017		Mass loading for inhalation (g/m**3)	6.000E-04	1.000E-04		---	MLINH

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
R017		Exposure duration	2.500E+01	3.000E+01		---	ED
R017		Shielding factor, inhalation	1.000E+00	4.000E-01		---	SHF3
R017		Shielding factor, external gamma	1.000E+00	7.000E-01		---	SHF1
R017		Fraction of time spent indoors	0.000E+00	5.000E-01		---	FIND
R017		Fraction of time spent outdoors (on site)	3.800E-02	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)	2.010E+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

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
	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		---	RDY(1)
	R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01		---	RDY(2)
	R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01		---	RDY(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
	C14	DCF correction factor for gaseous forms of C14	not used	8.894E+01		---	CO2F
	STOR	Storage times of contaminated foodstuffs (days) :					
	STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01		---	STOR_T(1)
	STOR	Leafy vegetables	1.000E+00	1.000E+00		---	STOR_T(2)
	STOR	Milk	1.000E+00	1.000E+00		---	STOR_T(3)
	STOR	Meat and poultry	2.000E+01	2.000E+01		---	STOR_T(4)
	STOR	Fish	7.000E+00	7.000E+00		---	STOR_T(5)
	STOR	Crustacea and mollusks	7.000E+00	7.000E+00		---	STOR_T(6)
	STOR	Well water	1.000E+00	1.000E+00		---	STOR_T(7)
	STOR	Surface water	1.000E+00	1.000E+00		---	STOR_T(8)
	STOR	Livestock fodder	4.500E+01	4.500E+01		---	STOR_T(9)

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
R021		Thickness of building foundation (m)	not used	1.500E-01		---	FLOOR1
R021		Bulk density of building foundation (g/cm**3)	not used	2.400E+00		---	DENSFL
R021		Total porosity of the cover material	not used	4.000E-01		---	TPCV
R021		Total porosity of the building foundation	not used	1.000E-01		---	TPFL
R021		Volumetric water content of the cover material	not used	5.000E-02		---	PH2OCV
R021		Volumetric water content of the foundation	not used	3.000E-02		---	PH2OFL
R021		Diffusion coefficient for radon gas (m/sec) :					
R021		in cover material	not used	2.000E-06		---	DIFCV
R021		in foundation material	not used	3.000E-07		---	DIFFL
R021		in contaminated zone soil	not used	2.000E-06		---	DIFCZ
R021		Radon vertical dimension of mixing (m)	not used	2.000E+00		---	HMX
R021		Average building air exchange rate (1/hr)	not used	5.000E-01		---	REXG
R021		Height of the building (room) (m)	not used	2.500E+00		---	HRM
R021		Building interior area factor	not used	0.000E+00		---	FAI
R021		Building depth below ground surface (m)	not used	-1.000E+00		---	DMFL
R021		Emanating power of Rn-222 gas	not used	2.500E-01		---	EMANA(1)
R021		Emanating power of Rn-220 gas	not used	1.500E-01		---	EMANA(2)
TITL		Number of graphical time points	32	---		---	NPTS
TITL		Maximum number of integration points for dose	17	---		---	LYMAX
TITL		Maximum number of integration points for risk	1	---		---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	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	active
=====	

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	10.00 square meters	Am-241	7.130E+00
Thickness:	0.30 meters	Co-60	1.600E-01
Cover Depth:	0.00 meters	Cs-137	1.940E+01
		Pu-238	4.010E+00
		Pu-239	2.500E+01
		Sr-90	2.520E+00
		U-234	1.290E+00
		U-235	1.270E-01
		U-238	1.380E+00

0

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)		Total Dose TDose(t), mrem/yr	
		Basic Radiation Dose Limit = 2.500E+01 mrem/yr	
t (years):	0.000E+00	3.000E+00	1.000E+01
TDose(t):	1.388E+00	1.294E+00	1.110E+00
M(t):	5.553E-02	5.176E-02	4.440E-02
OMaximum TDose(t): 1.388E+00 mrem/yr at t = 0.000E+00 years			

3.000E+02	1.000E+02	3.000E+02	1.000E+03
2.886E-01	0.000E+00	0.000E+00	0.000E+00
1.155E-02	0.000E+00	0.000E+00	0.000E+00

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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	6.069E-03	0.0044	5.046E-02	0.0363	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.969E-04	0.0001
Co-60	3.877E-02	0.0279	5.268E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.080E-08	0.0000
Cs-137	1.083E+00	0.7799	9.810E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.319E-06	0.0000
Pu-238	1.400E-05	0.0000	2.512E-02	0.0181	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.762E-05	0.0001
Pu-239	1.446E-04	0.0001	1.721E-01	0.1240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.759E-04	0.0005
Sr-90	1.013E-03	0.0007	5.214E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.899E-06	0.0000
U-234	1.039E-05	0.0000	2.723E-03	0.0020	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.779E-06	0.0000
U-235	1.744E-03	0.0013	2.498E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.582E-07	0.0000
U-238	3.526E-03	0.0025	2.604E-03	0.0019	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.826E-06	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	1.134E+00	0.8168	2.533E-01	0.1825	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.865E-04	0.0007

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+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-02	0.0409
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.877E-02	0.0279
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.083E+00	0.7799
Pu-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	2.524E-02	0.0182
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.729E-01	0.1246
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.068E-03	0.0008
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.736E-03	0.0020
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	1.994E-03	0.0014
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	6.133E-03	0.0044
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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+00	1.0000

0*Sum of all water independent and dependent pathways.

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

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	5.987E-03	0.0044	4.978E-02	0.0367	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.942E-04	0.0001
Co-60	3.396E-02	0.0251	4.618E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.700E-08	0.0000
Cs-137	1.056E+00	0.7789	9.572E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.141E-06	0.0000
Pu-238	1.389E-05	0.0000	2.492E-02	0.0184	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.684E-05	0.0001
Pu-239	1.446E-04	0.0001	1.721E-01	0.1269	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.758E-04	0.0005
Sr-90	9.810E-04	0.0007	5.051E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.808E-06	0.0000
U-234	1.032E-05	0.0000	2.704E-03	0.0020	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.760E-06	0.0000
U-235	1.732E-03	0.0013	2.482E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.567E-07	0.0000
U-238	3.501E-03	0.0026	2.586E-03	0.0019	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.806E-06	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	1.102E+00	0.8131	2.524E-01	0.1862	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.827E-04	0.0007

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.596E-02	0.0413
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.396E-02	0.0251
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.056E+00	0.7789
Pu-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	2.503E-02	0.0185
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.729E-01	0.1275
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.034E-03	0.0008
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.718E-03	0.0020
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	1.980E-03	0.0015
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	6.090E-03	0.0045
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	1.356E+00	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	5.826E-03	0.0045	4.844E-02	0.0374	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.890E-04	0.0001
Co-60	2.606E-02	0.0201	3.548E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.074E-08	0.0000
Cs-137	1.004E+00	0.7762	9.114E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.800E-06	0.0000
Pu-238	1.367E-05	0.0000	2.453E-02	0.0190	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.530E-05	0.0001
Pu-239	1.445E-04	0.0001	1.720E-01	0.1329	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.756E-04	0.0005
Sr-90	9.198E-04	0.0007	4.739E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.635E-06	0.0000
U-234	1.018E-05	0.0000	2.668E-03	0.0021	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.722E-06	0.0000
U-235	1.707E-03	0.0013	2.449E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.536E-07	0.0000
U-238	3.450E-03	0.0027	2.551E-03	0.0020	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.768E-06	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	1.043E+00	0.8057	2.505E-01	0.1936	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.751E-04	0.0008

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.446E-02	0.0421
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.606E-02	0.0201
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.004E+00	0.7762
Pu-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	2.464E-02	0.0190
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.728E-01	0.1336
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.699E-04	0.0007
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.681E-03	0.0021
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	1.952E-03	0.0015
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	6.004E-03	0.0046
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	1.294E+00	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	5.298E-03	0.0048	4.404E-02	0.0397	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.719E-04	0.0002
Co-60	1.031E-02	0.0093	1.411E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.249E-09	0.0000
Cs-137	8.433E-01	0.7597	7.676E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.727E-06	0.0000
Pu-238	1.292E-05	0.0000	2.319E-02	0.0209	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.009E-05	0.0001
Pu-239	1.442E-04	0.0001	1.718E-01	0.1548	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.749E-04	0.0006
Sr-90	7.343E-04	0.0007	3.793E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.108E-06	0.0000
U-234	9.746E-06	0.0000	2.543E-03	0.0023	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.594E-06	0.0000
U-235	1.625E-03	0.0015	2.342E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.435E-07	0.0000
U-238	3.278E-03	0.0030	2.431E-03	0.0022	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.638E-06	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	8.647E-01	0.7790	2.443E-01	0.2201	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.502E-04	0.0009

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.951E-02	0.0446
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.031E-02	0.0093
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.433E-01	0.7597
Pu-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	2.329E-02	0.0210
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.727E-01	0.1555
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.743E-04	0.0007
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.555E-03	0.0023
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	1.859E-03	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.711E-03	0.0051
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	1.110E+00	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	4.037E-03	0.0054	3.356E-02	0.0447	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.309E-04	0.0002
Co-60	7.289E-04	0.0010	1.012E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.917E-10	0.0000
Cs-137	5.111E-01	0.6808	4.700E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.506E-06	0.0000
Pu-238	1.101E-05	0.0000	1.975E-02	0.0263	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.674E-05	0.0001
Pu-239	1.433E-04	0.0002	1.713E-01	0.2282	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.729E-04	0.0009
Sr-90	3.856E-04	0.0005	2.007E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.116E-06	0.0000
U-234	8.827E-06	0.0000	2.217E-03	0.0030	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.262E-06	0.0000
U-235	1.411E-03	0.0019	2.071E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.182E-07	0.0000
U-238	2.829E-03	0.0038	2.118E-03	0.0028	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.299E-06	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	5.207E-01	0.6935	2.292E-01	0.3053	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.900E-04	0.0012

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.772E-02	0.0502
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.289E-04	0.0010
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.111E-01	0.6808
Pu-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	1.984E-02	0.0264
Pu-239	0.000E+00	0.0000	0.000E+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-01	0.2293
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.067E-04	0.0005
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.228E-03	0.0030
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	1.618E-03	0.0022
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.950E-03	0.0066
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	7.508E-01	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.560E-03	0.0054	1.295E-02	0.0449	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.055E-05	0.0002
Co-60	6.679E-08	0.0000	1.000E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.848E-14	0.0000
Cs-137	8.703E-02	0.3015	8.442E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.298E-07	0.0000
Pu-238	6.278E-06	0.0000	1.127E-02	0.0390	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.377E-05	0.0002
Pu-239	1.393E-04	0.0005	1.695E-01	0.5873	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.659E-04	0.0023
Sr-90	4.001E-05	0.0001	2.163E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.202E-07	0.0000
U-234	8.195E-06	0.0000	1.372E-03	0.0048	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.400E-06	0.0000
U-235	8.555E-04	0.0030	1.387E-04	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.524E-07	0.0000
U-238	1.661E-03	0.0058	1.309E-03	0.0045	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.420E-06	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	9.130E-02	0.3163	1.966E-01	0.6810	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.639E-04	0.0026

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.457E-02	0.0505
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.679E-08	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.703E-02	0.3015
Pu-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	1.132E-02	0.0392
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.703E-01	0.5901
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.229E-05	0.0001
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	1.382E-03	0.0048
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	9.943E-04	0.0034
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	2.972E-03	0.0103
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	2.886E-01	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years
Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

0*Sum of all water independent and dependent pathways.

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

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

0*Sum of all water independent and dependent pathways.

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

0Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00 1.000E+00 3.000E+00 1.000E+01 3.000E+02 1.000E+03									
Am-241	Am-241	1.000E+00	7.955E-03	7.848E-03	7.637E-03	6.944E-03	5.291E-03	2.042E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Am-241	Np-237	1.000E+00	4.541E-09	1.353E-08	3.111E-08	8.870E-08	2.232E-07	4.603E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Am-241	U-233	1.000E+00	5.155E-16	3.589E-15	1.873E-14	1.603E-13	1.191E-12	8.486E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Am-241	Th-229	1.000E+00	3.501E-19	5.230E-18	6.043E-17	1.548E-15	3.435E-14	8.827E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Am-241	SDSR(j)		7.955E-03	7.848E-03	7.637E-03	6.944E-03	5.291E-03	2.042E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0Co-60	Co-60	1.000E+00	2.423E-01	2.123E-01	1.629E-01	6.446E-02	4.556E-03	4.174E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0Cs-137	Cs-137	1.000E+00	5.580E-02	5.443E-02	5.178E-02	4.347E-02	2.635E-02	4.486E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0Pu-238	Pu-238	1.000E+00	6.293E-03	6.243E-03	6.143E-03	5.808E-03	4.947E-03	2.822E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-238	U-234	1.000E+00	3.002E-09	8.947E-09	2.057E-08	5.859E-08	1.466E-07	2.869E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-238	Th-230	1.000E+00	2.228E-14	1.553E-13	8.131E-13	7.028E-12	5.372E-11	4.179E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-238	Ra-226	1.000E+00	8.322E-17	1.243E-15	1.435E-14	3.669E-13	8.067E-12	1.957E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-238	Pb-210	1.000E+00	1.087E-21	3.339E-20	8.248E-19	6.002E-17	3.485E-15	2.162E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-238	Po-210	1.000E+00	1.132E-22	5.764E-21	2.127E-19	2.128E-17	1.400E-15	9.120E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-238	SDSR(j)		6.293E-03	6.243E-03	6.143E-03	5.808E-03	4.947E-03	2.822E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0Pu-239	Pu-239	1.000E+00	6.916E-03	6.915E-03	6.913E-03	6.906E-03	6.885E-03	6.813E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-239	U-235	1.000E+00	7.739E-12	2.314E-11	5.361E-11	1.568E-10	4.236E-10	1.089E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-239	Pa-231	1.000E+00	8.321E-17	5.805E-16	3.044E-15	2.649E-14	2.064E-13	1.706E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-239	Ac-227	1.000E+00	3.920E-18	5.811E-17	6.602E-16	1.593E-14	3.015E-13	5.032E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-239	SDSR(j)		6.916E-03	6.915E-03	6.913E-03	6.906E-03	6.885E-03	6.813E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0Sr-90	Sr-90	1.000E+00	4.239E-04	4.104E-04	3.849E-04	3.073E-04	1.614E-04	1.678E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0U-234	U-234	1.000E+00	2.121E-03	2.107E-03	2.078E-03	1.980E-03	1.725E-03	1.065E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Th-230	1.000E+00	2.362E-08	7.063E-08	1.637E-07	4.795E-07	1.302E-06	3.431E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Ra-226	1.000E+00	1.175E-10	8.199E-10	4.299E-09	3.735E-08	2.895E-07	2.303E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Pb-210	1.000E+00	1.917E-15	2.848E-14	3.253E-13	8.002E-12	1.590E-10	2.994E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Po-210	1.000E+00	2.308E-16	5.604E-15	9.263E-14	2.968E-12	6.499E-11	1.269E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	SDSR(j)		2.121E-03	2.107E-03	2.078E-03	1.981E-03	1.727E-03	1.071E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0U-235	U-235	1.000E+00	1.570E-02	1.559E-02	1.537E-02	1.463E-02	1.270E-02	7.696E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	Pa-231	1.000E+00	2.532E-07	7.557E-07	1.743E-06	5.018E-06	1.295E-05	2.822E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	Ac-227	1.000E+00	1.588E-08	1.094E-07	5.580E-07	4.402E-06	2.640E-05	1.045E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	SDSR(j)		1.570E-02	1.559E-02	1.537E-02	1.464E-02	1.274E-02	7.829E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0U-238	U-238	1.000E+00	4.444E-03	4.413E-03	4.350E-03	4.138E-03	3.587E-03	2.153E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	U-234	1.000E+00	3.003E-09	8.955E-09	2.061E-08	5.894E-08	1.492E-07	3.036E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Th-230	1.000E+00	2.229E-14	1.554E-13	8.142E-13	7.055E-12	5.433E-11	4.330E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Ra-226	1.000E+00	8.324E-17	1.243E-15	1.437E-14	3.679E-13	8.136E-12	2.010E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Pb-210	1.000E+00	1.087E-21	3.341E-20	8.254E-19	6.017E-17	3.510E-15	2.213E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Po-210	1.000E+00	1.133E-22	5.766E-21	2.129E-19	2.133E-17	1.410E-15	9.335E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	SDSR(j)		4.444E-03	4.413E-03	4.350E-03	4.139E-03	3.587E-03	2.153E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
\$ is used to indicate summation; the Greek sigma is not included in this font.
The DSR includes contributions from associated (half-life <= 30 days) daughters.

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

ONuclide (i)	t= 0.000E+00						1.000E+00	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	3.143E+03	3.186E+03	3.273E+03	3.600E+03	4.725E+03	5.487E+03	1.224E+04	1.224E+04	1.224E+04	*3.424E+12	*3.424E+12
Co-60	1.032E+02	1.178E+02	1.535E+02	3.878E+02	5.489E+02	5.989E+02	5.989E+02	5.989E+02	5.989E+02	*1.131E+15	*1.131E+15
Cs-137	4.480E+02	4.593E+02	4.828E+02	5.751E+02	9.489E+02	5.573E+03	5.573E+03	5.573E+03	5.573E+03	*8.701E+13	*8.701E+13
Pu-238	3.973E+03	4.005E+03	4.069E+03	4.304E+03	5.053E+03	8.859E+03	8.859E+03	8.859E+03	8.859E+03	*1.711E+13	*1.711E+13
Pu-239	3.615E+03	3.615E+03	3.615E+03	3.620E+03	3.631E+03	3.669E+03	3.669E+03	3.669E+03	3.669E+03	*6.212E+10	*6.212E+10
Sr-90	5.898E+04	6.091E+04	6.496E+04	8.136E+04	1.549E+05	1.490E+06	1.490E+06	1.490E+06	1.490E+06	*1.365E+14	*1.365E+14
U-234	1.179E+04	1.187E+04	1.203E+04	1.262E+04	1.448E+04	2.334E+04	2.334E+04	2.334E+04	2.334E+04	*6.245E+09	*6.245E+09
U-235	1.592E+03	1.604E+03	1.626E+03	1.708E+03	1.962E+03	3.193E+03	3.193E+03	3.193E+03	3.193E+03	*2.160E+06	*2.160E+06
U-238	5.625E+03	5.665E+03	5.747E+03	6.041E+03	6.970E+03	1.161E+04	1.161E+04	1.161E+04	1.161E+04	*3.360E+05	*3.360E+05
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
*At specific activity limit											

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

ONuclide (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)
Am-241	7.130E+00	0.000E+00	7.955E-03	3.143E+03	7.955E-03	3.143E+03
Co-60	1.600E-01	0.000E+00	2.423E-01	1.032E+02	2.423E-01	1.032E+02
Cs-137	1.940E+01	0.000E+00	5.580E-02	4.480E+02	5.580E-02	4.480E+02
Pu-238	4.010E+00	0.000E+00	6.293E-03	3.973E+03	6.293E-03	3.973E+03
Pu-239	2.500E+01	0.000E+00	6.916E-03	3.615E+03	6.916E-03	3.615E+03
Sr-90	2.520E+00	0.000E+00	4.239E-04	5.898E+04	4.239E-04	5.898E+04
U-234	1.290E+00	0.000E+00	2.121E-03	1.179E+04	2.121E-03	1.179E+04
U-235	1.270E-01	0.000E+00	1.570E-02	1.592E+03	1.570E-02	1.592E+03
U-238	1.380E+00	0.000E+00	4.444E-03	5.625E+03	4.444E-03	5.625E+03
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Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

ONuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr					
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02 3.000E+02 1.000E+03
Am-241	Am-241	1.000E+00	5.672E-02	5.596E-02	5.445E-02	4.951E-02	3.772E-02	1.456E-02 0.000E+00 0.000E+00
Am-237	Am-241	1.000E+00	3.238E-08	9.650E-08	2.219E-07	6.324E-07	1.591E-06	3.282E-06 0.000E+00 0.000E+00
U-233	Am-241	1.000E+00	3.676E-15	2.559E-14	1.336E-13	1.143E-12	8.492E-12	6.051E-11 0.000E+00 0.000E+00
Th-229	Am-241	1.000E+00	2.496E-18	3.729E-17	4.309E-16	1.104E-14	2.449E-13	6.293E-12 0.000E+00 0.000E+00
OCo-60	Co-60	1.000E+00	3.877E-02	3.396E-02	2.606E-02	1.031E-02	7.289E-04	6.679E-08 0.000E+00 0.000E+00
Ocs-137	Cs-137	1.000E+00	1.083E+00	1.056E+00	1.004E+00	8.433E-01	5.111E-01	8.703E-02 0.000E+00 0.000E+00
OPu-238	Pu-238	1.000E+00	2.524E-02	2.503E-02	2.464E-02	2.329E-02	1.984E-02	1.132E-02 0.000E+00 0.000E+00
OU-234	Pu-238	1.000E+00	1.204E-08	3.588E-08	8.249E-08	2.349E-07	5.879E-07	1.150E-06 0.000E+00 0.000E+00
U-234	U-234	1.000E+00	2.736E-03	2.717E-03	2.680E-03	2.554E-03	2.226E-03	1.374E-03 0.000E+00 0.000E+00
U-234	U-238	1.000E+00	4.1144E-09	1.236E-08	2.845E-08	8.133E-08	2.059E-07	4.190E-07 0.000E+00 0.000E+00
U-234	SDOSE(j)		2.736E-03	2.718E-03	2.680E-03	2.555E-03	2.226E-03	1.376E-03 0.000E+00 0.000E+00
OTH-230	Pu-238	1.000E+00	8.936E-14	6.229E-13	3.261E-12	2.818E-11	2.154E-10	1.676E-09 0.000E+00 0.000E+00
Th-230	U-234	1.000E+00	3.046E-08	9.111E-08	2.112E-07	6.185E-07	1.680E-06	4.426E-06 0.000E+00 0.000E+00
Th-230	U-238	1.000E+00	3.076E-14	2.1145E-13	1.124E-12	9.737E-12	7.498E-11	5.975E-10 0.000E+00 0.000E+00
Th-230	SDOSE(j)		3.046E-08	9.111E-08	2.112E-07	6.186E-07	1.680E-06	4.428E-06 0.000E+00 0.000E+00
ORa-226	Pu-238	1.000E+00	3.337E-16	4.983E-15	5.755E-14	1.471E-12	3.235E-11	7.846E-10 0.000E+00 0.000E+00
Ra-226	U-234	1.000E+00	1.516E-10	1.058E-09	5.545E-09	4.818E-08	3.734E-07	2.971E-06 0.000E+00 0.000E+00
Ra-226	U-238	1.000E+00	1.1149E-16	1.716E-15	1.983E-14	5.078E-13	1.123E-11	2.774E-10 0.000E+00 0.000E+00
Ra-226	SDOSE(j)		1.516E-10	1.058E-09	5.545E-09	4.818E-08	3.735E-07	2.972E-06 0.000E+00 0.000E+00
OPb-210	Pu-238	1.000E+00	4.359E-21	1.339E-19	3.307E-18	2.407E-16	1.397E-14	8.671E-13 0.000E+00 0.000E+00
Pb-210	U-234	1.000E+00	2.472E-15	3.674E-14	4.197E-13	1.032E-11	2.051E-10	3.862E-09 0.000E+00 0.000E+00
Pb-210	U-238	1.000E+00	1.500E-21	4.610E-20	1.139E-18	8.303E-17	4.843E-15	3.055E-13 0.000E+00 0.000E+00
Pb-210	SDOSE(j)		2.472E-15	3.674E-14	4.197E-13	1.032E-11	2.051E-10	3.864E-09 0.000E+00 0.000E+00
OPo-210	Pu-238	1.000E+00	4.541E-22	2.311E-20	8.530E-19	5.533E-17	5.615E-15	3.657E-13 0.000E+00 0.000E+00
Po-210	U-234	1.000E+00	2.978E-16	7.229E-15	1.195E-13	3.828E-12	8.384E-11	1.638E-09 0.000E+00 0.000E+00
Po-210	U-238	1.000E+00	1.563E-22	7.958E-21	2.938E-19	2.943E-17	1.946E-15	1.288E-13 0.000E+00 0.000E+00
Po-210	SDOSE(j)		2.978E-16	7.229E-15	1.195E-13	3.828E-12	8.385E-11	1.638E-09 0.000E+00 0.000E+00
OPu-239	Pu-239	1.000E+00	1.729E-01	1.729E-01	1.728E-01	1.727E-01	1.721E-01	1.703E-01 0.000E+00 0.000E+00
OU-235	Pu-239	1.000E+00	1.935E-10	5.786E-10	1.340E-09	3.919E-09	1.059E-08	2.722E-08 0.000E+00 0.000E+00
U-235	U-235	1.000E+00	1.994E-03	1.980E-03	1.952E-03	1.858E-03	1.613E-03	9.775E-04 0.000E+00 0.000E+00
U-235	SDOSE(j)		1.994E-03	1.980E-03	1.952E-03	1.858E-03	1.613E-03	9.775E-04 0.000E+00 0.000E+00
OPa-231	Pu-239	1.000E+00	2.080E-15	1.451E-14	7.611E-14	6.622E-13	5.159E-12	4.265E-11 0.000E+00 0.000E+00
Pa-231	U-235	1.000E+00	3.216E-08	9.597E-08	2.213E-07	6.372E-07	1.645E-06	3.585E-06 0.000E+00 0.000E+00
Pa-231	SDOSE(j)		3.216E-08	9.597E-08	2.213E-07	6.372E-07	1.645E-06	3.585E-06 0.000E+00 0.000E+00

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

ONuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr			
			t=	0.000E+00	1.000E+00	3.000E+01
Ac-227	Pu-239	1.000E+00	9.800E-17	1.453E-15	1.650E-14	3.983E-13
Ac-227	U-235	1.000E+00	2.017E-09	1.389E-08	7.087E-08	5.591E-07
Ac-227	\$DOSE(j)		2.017E-09	1.389E-08	7.087E-08	5.591E-07
OSr-90	Sr-90	1.000E+00	1.068E-03	1.034E-03	9.699E-04	7.743E-04
OU-238	U-238	1.000E+00	6.133E-03	6.090E-03	6.004E-03	5.711E-03
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BRF(i) is the branch fraction of the parent nuclide.

\$ is used to indicate summation; the Greek sigma is not included in this font.

ONuclide		Individual Nuclide Soil Concentration									
		Parent		BRF (i)		Parent Nuclide and Branch Fraction Indicated		S (j,t), pCi/g			
(j)	(i)										
t= 0.000E+00 1.000E+00 3.000E+00 6.000E+00 9.000E+00 1.000E+01 3.000E+01 1.000E+02 3.000E+02 1.000E+03											
Am-241	Am-241	1.000E+00	7.130E+00	7.034E+00	6.845E+00	6.224E+00	4.742E+00	1.831E+00	1.207E-01	8.870E-06	
Am-241	Am-241	1.000E+00	2.293E+00	6.779E-06	2.149E-05	5.604E-05	1.192E-04	1.345E-04	7.124E-05		
Am-241	Am-241	1.000E+00	0.000E+00	5.017E-12	4.458E-11	4.736E-10	3.756E-09	2.739E-08	8.671E-08	7.772E-08	
Am-241	Am-241	1.000E+00	0.000E+00	1.591E-16	4.253E-15	1.523E-13	3.739E-12	1.009E-10	1.250E-09	7.172E-09	
Co-60	Co-60	1.000E+00	1.600E-01	1.403E-01	1.078E-01	4.285E-02	3.074E-03	3.038E-07	1.095E-18	0.000E+00	
Co-137	Co-137	1.000E+00	1.940E+01	1.893E+01	1.802E+01	1.518E+01	9.295E+00	1.669E+00	1.236E-02	4.319E-10	
Pu-238	Pu-238	1.000E+00	4.010E+00	3.978E+00	3.915E+00	3.701E+00	3.152E+00	1.798E+00	3.615E-01	1.317E-03	
Pu-238	Pu-238	1.000E+00	0.000E+00	1.128E-05	3.335E-05	1.055E-04	2.727E-04	5.398E-04	3.663E-04	6.946E-06	
Pu-234	Pu-234	1.000E+00	1.290E+00	1.281E+00	1.264E+00	1.204E+00	1.049E+00	6.479E-01	1.635E-01	1.319E-03	
U-234	U-234	1.000E+00	0.000E+00	3.885E-06	1.150E-05	3.652E-05	9.547E-05	1.965E-04	1.488E-04	4.005E-06	
U-234	U-234	1.000E+00	1.290E+00	1.281E+00	1.264E+00	1.204E+00	1.050E+00	6.487E-01	1.640E-01	1.330E-03	
SS(j) :											
Pu-238	Pu-238	1.000E+00	0.000E+00	5.091E-11	4.537E-10	4.869E-09	3.972E-08	3.162E-07	1.205E-06	1.826E-06	
Th-230	Th-230	1.000E+00	0.000E+00	1.157E-05	3.448E-05	1.122E-04	3.147E-04	8.387E-04	1.469E-03	1.666E-03	
Th-230	Th-230	1.000E+00	0.000E+00	1.753E-11	1.563E-10	1.682E-09	1.382E-08	1.127E-07	4.535E-07	7.302E-07	
Th-230	SS(j) :										
Th-230	Th-230	1.000E+00	0.000E+00	1.157E-05	3.448E-05	1.122E-04	3.147E-04	8.392E-04	1.471E-03	1.669E-03	
Ra-226	Ra-226	1.000E+00	0.000E+00	7.354E-15	1.967E-13	7.050E-12	1.734E-10	4.663E-09	5.329E-08	1.880E-07	
Ra-226	Ra-226	1.000E+00	0.000E+00	2.506E-09	2.240E-08	2.427E-07	2.034E-06	1.773E-05	8.424E-05	1.780E-04	
Ra-226	Ra-226	1.000E+00	0.000E+00	2.532E-15	6.775E-14	2.433E-12	6.018E-11	1.648E-09	1.968E-08	7.451E-08	
SS(j) :											
Pu-238	Pu-238	1.000E+00	0.000E+00	2.506E-09	2.240E-08	2.427E-07	2.034E-06	1.774E-05	8.431E-05	1.782E-04	
Pu-238	Pu-238	1.000E+00	0.000E+00	5.682E-17	4.508E-15	5.177E-13	3.432E-11	2.232E-09	4.107E-08	1.725E-07	
U-234	U-234	1.000E+00	0.000E+00	2.578E-11	6.808E-10	2.337E-08	5.124E-07	9.992E-06	6.922E-05	1.642E-04	
U-238	U-238	1.000E+00	0.000E+00	1.956E-17	1.552E-15	1.786E-13	1.189E-11	7.863E-10	1.510E-08	6.830E-08	
SS(j) :											
Pu-238	Pu-238	1.000E+00	0.000E+00	2.578E-11	6.808E-10	2.337E-08	5.124E-07	9.995E-06	6.927E-05	1.644E-04	
Pu-238	Pu-238	1.000E+00	0.000E+00	1.577E-17	2.473E-15	4.187E-13	3.173E-11	2.167E-09	4.039E-08	1.703E-07	
Po-210	Po-210	1.000E+00	0.000E+00	8.495E-12	4.180E-10	1.981E-08	4.820E-07	9.749E-06	6.817E-05	1.621E-04	
Po-210	Po-210	1.000E+00	0.000E+00	5.427E-18	8.516E-16	1.444E-13	1.099E-11	7.631E-10	1.485E-08	6.741E-08	
SS(j) :											
Pu-239	Pu-239	1.000E+00	2.500E+01	2.499E+01	2.496E+01	2.489E+01	2.463E+01	2.390E+01	2.152E+01		
Pu-239	Pu-239	1.000E+00	0.000E+00	2.454E-08	7.309E-08	2.378E-07	6.658E-07	1.765E-06	3.032E-06	3.144E-06	
U-235	U-235	1.000E+00	1.270E-01	1.261E-01	1.244E-01	1.186E-01	1.033E-01	6.381E-02	1.611E-02	1.302E-04	
SS(j) :											
U-235	U-235	1.000E+00	1.270E-01	1.261E-01	1.244E-01	1.186E-01	1.033E-01	6.381E-02	1.611E-02	1.333E-04	
Pa-231	Pa-231	1.000E+00	0.000E+00	2.594E-13	2.317E-12	2.504E-11	2.084E-10	1.771E-09	7.842E-09	1.379E-08	
Pa-231	Pa-231	1.000E+00	0.000E+00	2.671E-06	7.921E-06	2.534E-05	6.762E-05	1.497E-04	1.409E-04	9.009E-06	
Pa-231	SS(j) :										
Pa-231	Pa-231	1.000E+00	0.000E+00	2.671E-06	7.921E-06	2.534E-05	6.762E-05	1.497E-04	1.409E-04	9.023E-06	

Individual Nuclide Soil Concentration										
Parent Nuclide and Branch Fraction Indicated			S(j,t), pCi/g							
ONuclide	Parent	BRF(i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
	(j)	(i)								
Ac-227	Pu-239	1.000E+00	0.000E+00	2.726E-15	7.160E-14	2.412E-12	5.042E-11	8.770E-10	5.238E-09	1.002E-08
Ac-227	U-235	1.000E+00	0.000E+00	4.199E-08	3.643E-07	3.568E-06	2.285E-05	9.318E-05	1.075E-04	7.296E-06
Ac-227	SS(j) :		0.000E+00	4.199E-08	3.643E-07	3.568E-06	2.285E-05	9.318E-05	1.076E-04	7.306E-06
OSr-90	Sr-90	1.000E+00	2.520E+00	2.441E+00	2.291E+00	1.833E+00	9.699E-01	1.045E-01	1.798E-04	3.798E-14
OU-238	U-238	1.000E+00	1.380E+00	1.371E+00	1.352E+00	1.288E+00	1.123E+00	6.934E-01	1.750E-01	1.415E-03

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

S is used to indicate summation; the Greek sigma is not included in this font.

ORESCALC.EXE execution time = 2.77 seconds

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Exhibit 4

RESRAD Scenario CAS 10-09-02 Hot Spot 1m²

(27 Pages)

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines
=====

Dose Conversion Factor (and Related) Parameter Summary ...	2
Site-Specific Parameter Summary	6
Summary of Pathway Selections	12
Contaminated Zone and Total Dose Summary	13
Total Dose Components	
Time = 0.000E+00	14
Time = 1.000E+00	15
Time = 3.000E+00	16
Time = 1.000E+01	17
Time = 3.000E+01	18
Time = 1.000E+02	19
Time = 3.000E+02	20
Time = 1.000E+03	21
Dose/Source Ratios Summed Over All Pathways	22
Single Radionuclide Soil Guidelines	23
Dose Per Nuclide Summed Over All Pathways	24
Soil Concentration Per Nuclide	26

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	Am-241	4.440E-01	4.440E-01	DCF2 (2)
B-1	Co-60	2.190E-04	2.190E-04	DCF2 (3)
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2 (4)
B-1	Np-237+D	5.400E-01	5.400E-01	DCF2 (5)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2 (6)
B-1	Pb-210+D	1.380E-02	1.380E-02	DCF2 (7)
B-1	Po-210	9.400E-03	9.400E-03	DCF2 (8)
B-1	Pu-238	3.920E-01	3.920E-01	DCF2 (9)
B-1	Pu-239	4.290E-01	4.290E-01	DCF2 (10)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2 (11)
B-1	Sr-90+D	1.310E-03	1.310E-03	DCF2 (12)
B-1	Th-229+D	2.160E+00	2.160E+00	DCF2 (13)
B-1	Th-230	3.260E-01	3.260E-01	DCF2 (14)
B-1	U-233	1.350E-01	1.350E-01	DCF2 (15)
B-1	U-234	1.320E-01	1.320E-01	DCF2 (16)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2 (17)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2 (18)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3 (1)
D-1	Am-241	3.640E-03	3.640E-03	DCF3 (2)
D-1	Co-60	2.690E-05	2.690E-05	DCF3 (3)
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3 (4)
D-1	Np-237+D	4.440E-03	4.440E-03	DCF3 (5)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3 (6)
D-1	Pb-210+D	5.370E-03	5.370E-03	DCF3 (7)
D-1	Po-210	1.900E-03	1.900E-03	DCF3 (8)
D-1	Pu-238	3.200E-03	3.200E-03	DCF3 (9)
D-1	Pu-239	3.540E-03	3.540E-03	DCF3 (10)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3 (11)
D-1	Sr-90+D	1.530E-04	1.530E-04	DCF3 (12)
D-1	Th-229+D	4.030E-03	4.030E-03	DCF3 (13)
D-1	Th-230	5.480E-04	5.480E-04	DCF3 (14)
D-1	U-233	2.890E-04	2.890E-04	DCF3 (15)
D-1	U-234	2.830E-04	2.830E-04	DCF3 (16)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3 (17)
D-1	U-238+D	2.690E-04	2.690E-04	DCF3 (18)
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	Am-241 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (2,1)
D-34	Am-241 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-05	5.000E-05	RTF (2,2)
D-34	Am-241 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-06	2.000E-06	RTF (2,3)

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

File: FGR 13 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF (3,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF (3,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF (3,3)
D-34				
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF (4,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF (4,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF (4,3)
D-34				
D-34	Np-237+D , plant/soil concentration ratio, dimensionless	2.000E-02	2.000E-02	RTF (5,1)
D-34	Np-237+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF (5,2)
D-34	Np-237+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF (5,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF (6,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF (6,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF (6,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF (7,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF (7,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF (7,3)
D-34				
D-34	Po-210 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (8,1)
D-34	Po-210 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF (8,2)
D-34	Po-210 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.400E-04	3.400E-04	RTF (8,3)
D-34				
D-34	Pu-238 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (9,1)
D-34	Pu-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF (9,2)
D-34	Pu-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF (9,3)
D-34				
D-34	Pu-239 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (10,1)
D-34	Pu-239 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF (10,2)
D-34	Pu-239 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF (10,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF (11,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF (11,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF (11,3)
D-34				
D-34	Sr-90+D , plant/soil concentration ratio, dimensionless	3.000E-01	3.000E-01	RTF (12,1)
D-34	Sr-90+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-03	8.000E-03	RTF (12,2)
D-34	Sr-90+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF (12,3)
D-34				
D-34	Th-229+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (13,1)
D-34	Th-229+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF (13,2)
D-34	Th-229+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF (13,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (14,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF (14,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF (14,3)
D-34				
D-34	U-233 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF (15,1)
D-34	U-233 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF (15,2)
D-34	U-233 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF (15,3)

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

File: FGR 13 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
0				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(16,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(16,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(16,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(17,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(17,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(17,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(18,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(18,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(18,3)
D-5				
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	Am-241 , fish	3.000E+01	3.000E+01	BIOFAC(2,1)
D-5	Am-241 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(2,2)
D-5				
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(3,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(3,2)
D-5				
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(4,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(4,2)
D-5				
D-5	Np-237+D , fish	3.000E+01	3.000E+01	BIOFAC(5,1)
D-5	Np-237+D , crustacea and mollusks	4.000E+02	4.000E+02	BIOFAC(5,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(6,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(6,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(7,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(7,2)
D-5				
D-5	Po-210 , fish	1.000E+02	1.000E+02	BIOFAC(8,1)
D-5	Po-210 , crustacea and mollusks	2.000E+04	2.000E+04	BIOFAC(8,2)
D-5				
D-5	Pu-238 , fish	3.000E+01	3.000E+01	BIOFAC(9,1)
D-5	Pu-238 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(9,2)
D-5				
D-5	Pu-239 , fish	3.000E+01	3.000E+01	BIOFAC(10,1)
D-5	Pu-239 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(10,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(11,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(11,2)
D-5				
D-5	Sr-90+D , fish	6.000E+01	6.000E+01	BIOFAC(12,1)
D-5	Sr-90+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(12,2)
D-5				
D-5	Th-229+D , fish	1.000E+02	1.000E+02	BIOFAC(13,1)
D-5	Th-229+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(13,2)

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

File: FGR 13 Morbidity

0	Menu	Parameter	Current Value	Default	Parameter Name
D-5	Th-230	, fish	1.000E+02	1.000E+02	BIOFAC (14,1)
D-5	Th-230	, crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC (14,2)
D-5	U-233	, fish	1.000E+01	1.000E+01	BIOFAC (15,1)
D-5	U-233	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC (15,2)
D-5	U-234	, fish	1.000E+01	1.000E+01	BIOFAC (16,1)
D-5	U-234	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC (16,2)
D-5	U-235+D	, fish	1.000E+01	1.000E+01	BIOFAC (17,1)
D-5	U-235+D	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC (17,2)
D-5	U-238+D	, fish	1.000E+01	1.000E+01	BIOFAC (18,1)
D-5	U-238+D	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC (18,2)
=====					

Site-Specific Parameter Summary									
Menu	Parameter	User Input	Default	(If different from user input)		Used by RESRAD		Parameter Name	
R011	Area of contaminated zone (m**2)	1.000E+00	1.000E+04			---		AREA	
R011	Thickness of contaminated zone (m)	3.000E-01	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	2.500E+01			---		BRDL	
R011	Time since placement of material (yr)	0.000E+00	0.000E+00			---		TI	
R011	Times for calculations (yr)	1.000E+00	1.000E+00			---		T (2)	
R011	Times for calculations (yr)	3.000E+00	3.000E+00			---		T (3)	
R011	Times for calculations (yr)	1.000E+01	1.000E+01			---		T (4)	
R011	Times for calculations (yr)	3.000E+01	3.000E+01			---		T (5)	
R011	Times for calculations (yr)	1.000E+02	1.000E+02			---		T (6)	
R011	Times for calculations (yr)	3.000E+02	3.000E+02			---		T (7)	
R011	Times for calculations (yr)	1.000E+03	1.000E+03			---		T (8)	
R011	Times for calculations (yr)	not used	0.000E+00			---		T (9)	
R011	Times for calculations (yr)	not used	0.000E+00			---		T(10)	
R012	Initial principal radionuclide (pci/g): Am-241	7.130E+00	0.000E+00			---		S1 (2)	
R012	Initial principal radionuclide (pci/g): Co-60	1.600E-01	0.000E+00			---		S1 (3)	
R012	Initial principal radionuclide (pci/g): Cs-137	1.940E+01	0.000E+00			---		S1 (4)	
R012	Initial principal radionuclide (pci/g): Pu-238	4.010E+00	0.000E+00			---		S1 (9)	
R012	Initial principal radionuclide (pci/g): Pu-239	2.500E+01	0.000E+00			---		S1(10)	
R012	Initial principal radionuclide (pci/g): Sr-90	2.520E+00	0.000E+00			---		S1(12)	
R012	Initial principal radionuclide (pci/g): U-234	1.290E+00	0.000E+00			---		S1(16)	
R012	Initial principal radionuclide (pci/g): U-235	1.270E-21	0.000E+00			---		S1(17)	
R012	Initial principal radionuclide (pci/g): U-238	1.380E+00	0.000E+00			---		S1(18)	
R012	Concentration in groundwater (pci/L): Am-241	not used	0.000E+00			---		W1 (2)	
R012	Concentration in groundwater (pci/L): Co-60	not used	0.000E+00			---		W1 (3)	
R012	Concentration in groundwater (pci/L): Cs-137	not used	0.000E+00			---		W1 (4)	
R012	Concentration in groundwater (pci/L): Pu-238	not used	0.000E+00			---		W1 (9)	
R012	Concentration in groundwater (pci/L): Pu-239	not used	0.000E+00			---		W1(10)	
R012	Concentration in groundwater (pci/L): Sr-90	not used	0.000E+00			---		W1(12)	
R012	Concentration in groundwater (pci/L): U-234	not used	0.000E+00			---		W1(16)	
R012	Concentration in groundwater (pci/L): U-235	not used	0.000E+00			---		W1(17)	
R012	Concentration in groundwater (pci/L): U-238	not used	0.000E+00			---		W1(18)	
R013	Cover depth (m)	0.000E+00	0.000E+00			---		COVER0	
R013	Density of cover material (g/cm**3)	not used	1.500E+00			---		DENSCV	
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03			---		VCV	
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00			---		DENSCZ	
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03			---		VCZ	
R013	Contaminated zone total porosity	4.000E-01	4.000E-01			---		TPCZ	
R013	Contaminated zone field capacity	2.000E-01	2.000E-01			---		FCCZ	
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01			---		HCCZ	
R013	Contaminated zone b parameter	5.300E+00	5.300E+00			---		BCZ	
R013	Average annual wind speed (m/sec)	3.500E+00	2.000E+00			---		WIND	
R013	Humidity in air (g/m**3)	not used	8.000E+00			---		HUMID	
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01			---		EVAPTR	
R013	Precipitation (m/yr)	3.000E-02	1.000E+00			---		PRECIP	
R013	Irrigation (m/yr)	2.000E-01	2.000E-01			---		RI	
R013	Irrigation mode	overhead	overhead			---		IDITCH	
R013	Runoff coefficient	4.000E-01	2.000E-01			---		RUNOFF	
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06			---		WAREA	

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
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							
R015		Number of unsaturated zone strata	not used	1		---	NS
R015		Unsat. zone 1, thickness (m)	not used	4.000E+00		---	H(1)
R015		Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00		---	DENSUZ(1)
R015		Unsat. zone 1, total porosity	not used	4.000E-01		---	TPUZ(1)
R015		Unsat. zone 1, effective porosity	not used	2.000E-01		---	EPUZ(1)
R015		Unsat. zone 1, field capacity	not used	2.000E-01		---	FCUZ(1)
R015		Unsat. zone 1, soil-specific b parameter	not used	5.300E+00		---	BUZ(1)
R015		Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01		---	HCUZ(1)
R016							
R016		Distribution coefficients for Am-241					
R016		Contaminated zone (cm**3/g)	2.000E+01	2.000E+01		---	DCNUCC(2)
R016		Unsat. zone 1 (cm**3/g)	not used	2.000E+01		---	DCNUCU(2,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+01		---	DCNUCS(2)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.200E-02 not used	ALEACH(2)
R016		Solubility constant	0.000E+00	0.000E+00			SOLUBK(2)
R016							
R016		Distribution coefficients for Co-60					
R016		Contaminated zone (cm**3/g)	1.000E+03	1.000E+03		---	DCNUCC(3)
R016		Unsat. zone 1 (cm**3/g)	not used	1.000E+03		---	DCNUCU(3,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+03		---	DCNUCS(3)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		2.422E-04 not used	ALEACH(3)
R016		Solubility constant	0.000E+00	0.000E+00			SOLUBK(3)
R016							
R016		Distribution coefficients for Cs-137					
R016		Contaminated zone (cm**3/g)	1.700E+02	1.000E+03		---	DCNUCC(4)
R016		Unsat. zone 1 (cm**3/g)	not used	1.000E+03		---	DCNUCU(4,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+03		---	DCNUCS(4)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.423E-03 not used	ALEACH(4)
R016		Solubility constant	0.000E+00	0.000E+00			SOLUBK(4)
R016							
R016		Distribution coefficients for Pu-238					
R016		Contaminated zone (cm**3/g)	2.000E+03	2.000E+03		---	DCNUCC(9)
R016		Unsat. zone 1 (cm**3/g)	not used	2.000E+03		---	DCNUCU(9,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+03		---	DCNUCS(9)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.211E-04 not used	ALEACH(9)
R016		Solubility constant	0.000E+00	0.000E+00			SOLUBK(9)

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
		Distribution coefficients for Pu-239					
R016		Contaminated zone (cm**3/g)	2.000E+03	2.000E+03		---	DCNUCC (10)
R016		Unsaturated zone 1 (cm**3/g)	not used	2.000E+03		---	DCNUCU (10,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+03		---	DCNUCS (10)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.211E-04	ALEACH (10)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (10)
		Distribution coefficients for Sr-90					
R016		Contaminated zone (cm**3/g)	3.000E+01	3.000E+01		---	DCNUCC (12)
R016		Unsaturated zone 1 (cm**3/g)	not used	3.000E+01		---	DCNUCU (12,1)
R016		Saturated zone (cm**3/g)	not used	3.000E+01		---	DCNUCS (12)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		8.023E-03	ALEACH (12)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (12)
		Distribution coefficients for U-234					
R016		Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC (16)
R016		Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (16,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (16)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		6.883E-03	ALEACH (16)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (16)
		Distribution coefficients for U-235					
R016		Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC (17)
R016		Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (17,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (17)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		6.883E-03	ALEACH (17)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (17)
		Distribution coefficients for U-238					
R016		Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC (18)
R016		Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (18,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (18)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		6.883E-03	ALEACH (18)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (18)
		Distribution coefficients for daughter Ac-227					
R016		Contaminated zone (cm**3/g)	2.000E+01	2.000E+01		---	DCNUCC (1)
R016		Unsaturated zone 1 (cm**3/g)	not used	2.000E+01		---	DCNUCU (1,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+01		---	DCNUCS (1)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.200E-02	ALEACH (1)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (1)
		Distribution coefficients for daughter Np-237					
R016		Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00		2.574E+02	DCNUCC (5)
R016		Unsaturated zone 1 (cm**3/g)	not used	-1.000E+00		---	DCNUCU (5,1)
R016		Saturated zone (cm**3/g)	not used	-1.000E+00		---	DCNUCS (5)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		9.402E-04	ALEACH (5)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (5)

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
		Distribution coefficients for daughter Pa-231					
R016		Contaminated zone (cm**3/g)	5.000E+01	5.000E+01		---	DCNUCC (6)
R016		Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (6,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (6)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		4.826E-03	ALEACH (6)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (6)
		Distribution coefficients for daughter Pb-210					
R016		Contaminated zone (cm**3/g)	1.000E+02	1.000E+02		---	DCNUCC (7)
R016		Unsaturated zone 1 (cm**3/g)	not used	1.000E+02		---	DCNUCU (7,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+02		---	DCNUCS (7)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		2.418E-03	ALEACH (7)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (7)
		Distribution coefficients for daughter Po-210					
R016		Contaminated zone (cm**3/g)	1.000E+01	1.000E+01		---	DCNUCC (8)
R016		Unsaturated zone 1 (cm**3/g)	not used	1.000E+01		---	DCNUCU (8,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+01		---	DCNUCS (8)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		2.377E-02	ALEACH (8)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (8)
		Distribution coefficients for daughter Ra-226					
R016		Contaminated zone (cm**3/g)	7.000E+01	7.000E+01		---	DCNUCC (11)
R016		Unsaturated zone 1 (cm**3/g)	not used	7.000E+01		---	DCNUCU (11,1)
R016		Saturated zone (cm**3/g)	not used	7.000E+01		---	DCNUCS (11)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		3.451E-03	ALEACH (11)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (11)
		Distribution coefficients for daughter Th-229					
R016		Contaminated zone (cm**3/g)	6.000E+04	6.000E+04		---	DCNUCC (13)
R016		Unsaturated zone 1 (cm**3/g)	not used	6.000E+04		---	DCNUCU (13,1)
R016		Saturated zone (cm**3/g)	not used	6.000E+04		---	DCNUCS (13)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		4.037E-06	ALEACH (13)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (13)
		Distribution coefficients for daughter Th-230					
R016		Contaminated zone (cm**3/g)	6.000E+04	6.000E+04		---	DCNUCC (14)
R016		Unsaturated zone 1 (cm**3/g)	not used	6.000E+04		---	DCNUCU (14,1)
R016		Saturated zone (cm**3/g)	not used	6.000E+04		---	DCNUCS (14)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		4.037E-06	ALEACH (14)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (14)
		Distribution coefficients for daughter U-233					
R016		Contaminated zone (cm**3/g)	5.000E+01	5.000E+01		---	DCNUCC (15)
R016		Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (15,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (15)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		4.826E-03	ALEACH (15)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (15)
R017		Inhalation rate (m**3/yr)	1.230E+04	8.400E+03		---	INHALR
R017		Mass loading for inhalation (g/m**3)	6.000E-04	1.000E-04		---	MLINH

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
R017		Exposure duration	2.500E+01	3.000E+01		---	ED
R017		Shielding factor, inhalation	1.000E+00	4.000E-01		---	SHF3
R017		Shielding factor, external gamma	1.000E+00	7.000E-01		---	SHF1
R017		Fraction of time spent indoors	0.000E+00	5.000E-01		---	FIND
R017		Fraction of time spent outdoors (on site)	3.800E-02	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)	2.010E+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

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
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		---	RDY(1)
R19B		Dry Foliar Interception Fraction for Leafy	not used	2.500E-01		---	RDY(2)
R19B		Dry Foliar Interception Fraction for Fodder	not used	2.500E-01		---	RDY(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
C14		DCF correction factor for gaseous forms of C14	not used	8.894E+01		---	CO2F
STOR		Storage times of contaminated foodstuffs (days) :					
STOR		Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01		---	STOR_T(1)
STOR		Leafy vegetables	1.000E+00	1.000E+00		---	STOR_T(2)
STOR		Milk	1.000E+00	1.000E+00		---	STOR_T(3)
STOR		Meat and poultry	2.000E+01	2.000E+01		---	STOR_T(4)
STOR		Fish	7.000E+00	7.000E+00		---	STOR_T(5)
STOR		Crustacea and mollusks	7.000E+00	7.000E+00		---	STOR_T(6)
STOR		Well water	1.000E+00	1.000E+00		---	STOR_T(7)
STOR		Surface water	1.000E+00	1.000E+00		---	STOR_T(8)
STOR		Livestock fodder	4.500E+01	4.500E+01		---	STOR_T(9)

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
		R021 Thickness of building foundation (m)	not used	1.500E-01		---	FLOOR1
		R021 Bulk density of building foundation (g/cm**3)	not used	2.400E+00		---	DENSFL
		R021 Total porosity of the cover material	not used	4.000E-01		---	TPCV
		R021 Total porosity of the building foundation	not used	1.000E-01		---	TPFL
		R021 Volumetric water content of the cover material	not used	5.000E-02		---	PH2OCV
		R021 Volumetric water content of the foundation	not used	3.000E-02		---	PH2OFL
		R021 Diffusion coefficient for radon gas (m/sec) :					
		R021 in cover material	not used	2.000E-06		---	DIFCV
		R021 in foundation material	not used	3.000E-07		---	DIFFL
		R021 in contaminated zone soil	not used	2.000E-06		---	DIFCZ
		R021 Radon vertical dimension of mixing (m)	not used	2.000E+00		---	HMX
		R021 Average building air exchange rate (1/hr)	not used	5.000E-01		---	REXG
		R021 Height of the building (room) (m)	not used	2.500E+00		---	HRM
		R021 Building interior area factor	not used	0.000E+00		---	FAI
		R021 Building depth below ground surface (m)	not used	-1.000E+00		---	DMFL
		R021 Emanating power of Rn-222 gas	not used	2.500E-01		---	EMANA(1)
		R021 Emanating power of Rn-220 gas	not used	1.500E-01		---	EMANA(2)
		TITL Number of graphical time points	32	---		---	NPTS
		TITL Maximum number of integration points for dose	17	---		---	LYMAX
		TITL Maximum number of integration points for risk	1	---		---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	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	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	1.00 square meters	Am-241	7.130E+00
Thickness:	0.30 meters	Co-60	1.600E-01
Cover Depth:	0.00 meters	Cs-137	1.940E+01
		Pu-238	4.010E+00
		Pu-239	2.500E+01
		Sr-90	2.520E+00
		U-234	1.290E+00
		U-235	1.270E-01
		U-238	1.380E+00

0

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)		Total Dose TDose(t), mrem/yr	
Basic Radiation Dose Limit = 2.500E+01 mrem/yr			
t (years):	0.000E+00	3.000E+00	1.000E+01
TDose(t):	4.367E-01	4.151E-01	3.725E-01
M(t):	1.747E-02	1.660E-02	1.490E-02
Maximum TDose(t): 4.367E-01 mrem/yr at t = 0.000E+00 years			
		3.000E+02	1.000E+03
		0.000E+00	0.000E+00
		0.000E+00	0.000E+00

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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.479E-03	0.0034	3.916E-02	0.0897	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.969E-05	0.0000
Co-60	8.065E-03	0.0185	4.089E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.080E-09	0.0000
Cs-137	2.291E-01	0.5246	7.613E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.319E-07	0.0000
Pu-238	3.642E-06	0.0000	1.950E-02	0.0446	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.762E-06	0.0000
Pu-239	3.362E-05	0.0001	1.336E-01	0.3058	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.759E-05	0.0002
Sr-90	2.131E-04	0.0005	4.047E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.899E-07	0.0000
U-234	2.525E-06	0.0000	2.113E-03	0.0048	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.779E-07	0.0000
U-235	3.788E-04	0.0009	1.939E-04	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.582E-08	0.0000
U-238	7.559E-04	0.0017	2.021E-03	0.0046	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.826E-07	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	2.400E-01	0.5496	1.966E-01	0.4502	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.865E-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 = 0.000E+00 years
Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.066E-02	0.0931
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.065E-03	0.0185
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.291E-01	0.5246
Pu-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	1.951E-02	0.0447
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.337E-01	0.3061
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.538E-04	0.0006
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.116E-03	0.0048
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	5.728E-04	0.0013
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	2.777E-03	0.0064
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	4.367E-01	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.459E-03	0.0034	3.863E-02	0.0900	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.942E-05	0.0000
Co-60	7.063E-03	0.0165	3.584E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.700E-09	0.0000
Cs-137	2.234E-01	0.5204	7.429E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.141E-07	0.0000
Pu-238	3.613E-06	0.0000	1.934E-02	0.0451	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.684E-06	0.0000
Pu-239	3.360E-05	0.0001	1.335E-01	0.3111	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.758E-05	0.0002
Sr-90	2.063E-04	0.0005	3.920E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.808E-07	0.0000
U-234	2.508E-06	0.0000	2.099E-03	0.0049	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.760E-07	0.0000
U-235	3.761E-04	0.0009	1.926E-04	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.567E-08	0.0000
U-238	7.502E-04	0.0017	2.007E-03	0.0047	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.806E-07	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	2.333E-01	0.5435	1.959E-01	0.4563	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.827E-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+00 years
Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.011E-02	0.0934
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.064E-03	0.0165
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.234E-01	0.5205
Pu-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	1.936E-02	0.0451
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.336E-01	0.3113
Sr-90	0.000E+00	0.0000	0.000E+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-04	0.0006
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.102E-03	0.0049
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	5.687E-04	0.0013
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	2.758E-03	0.0064
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	4.292E-01	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.420E-03	0.0034	3.759E-02	0.0906	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.890E-05	0.0000
Co-60	5.418E-03	0.0131	2.754E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.074E-09	0.0000
Cs-137	2.124E-01	0.5117	7.073E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.800E-07	0.0000
Pu-238	3.556E-06	0.0000	1.903E-02	0.0459	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.530E-06	0.0000
Pu-239	3.358E-05	0.0001	1.335E-01	0.3216	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.756E-05	0.0002
Sr-90	1.933E-04	0.0005	3.678E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.635E-07	0.0000
U-234	2.474E-06	0.0000	2.070E-03	0.0050	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.722E-07	0.0000
U-235	3.707E-04	0.0009	1.901E-04	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.536E-08	0.0000
U-238	7.391E-04	0.0018	1.980E-03	0.0048	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.768E-07	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	2.206E-01	0.5314	1.944E-01	0.4683	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.751E-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 = 3.000E+00 years
Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.903E-02	0.0940
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.418E-03	0.0131
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.124E-01	0.5117
Pu-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	1.905E-02	0.0459
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.336E-01	0.3218
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.304E-04	0.0006
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.073E-03	0.0050
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	5.608E-04	0.0014
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	2.719E-03	0.0066
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	4.151E-01	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.291E-03	0.0035	3.418E-02	0.0918	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.719E-05	0.0000
Co-60	2.141E-03	0.0057	1.095E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.249E-10	0.0000
Cs-137	1.781E-01	0.4781	5.957E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.727E-07	0.0000
Pu-238	3.362E-06	0.0000	1.800E-02	0.0483	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.000E-06	0.0000
Pu-239	3.348E-05	0.0001	1.334E-01	0.3580	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.749E-05	0.0002
Sr-90	1.541E-04	0.0004	2.943E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.108E-07	0.0000
U-234	2.367E-06	0.0000	1.973E-03	0.0053	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.594E-07	0.0000
U-235	3.524E-04	0.0009	1.817E-04	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.435E-08	0.0000
U-238	7.013E-04	0.0019	1.887E-03	0.0051	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.638E-07	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	1.828E-01	0.4907	1.896E-01	0.5091	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.502E-05	0.0003

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.549E-02	0.0953
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.141E-03	0.0057
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.781E-01	0.4781
Pu-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	1.801E-02	0.0483
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.335E-01	0.3583
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.838E-04	0.0005
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	1.976E-03	0.0053
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	5.341E-04	0.0014
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	2.588E-03	0.0069
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	3.725E-01	1.0000

0*Sum of all water independent and dependent pathways.

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

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	9.839E-04	0.0034	2.604E-02	0.0905	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.309E-05	0.0000
Co-60	1.507E-04	0.0005	7.854E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.917E-11	0.0000
Cs-137	1.075E-01	0.3737	3.648E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.506E-07	0.0000
Pu-238	2.864E-06	0.0000	1.533E-02	0.0533	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.674E-06	0.0000
Pu-239	3.319E-05	0.0001	1.330E-01	0.4623	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.729E-05	0.0002
Sr-90	8.057E-05	0.0003	1.557E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.116E-07	0.0000
U-234	2.132E-06	0.0000	1.720E-03	0.0060	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.262E-07	0.0000
U-235	3.049E-04	0.0011	1.608E-04	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.182E-08	0.0000
U-238	6.031E-04	0.0021	1.644E-03	0.0057	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.299E-07	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	1.096E-01	0.3812	1.779E-01	0.6184	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.900E-05	0.0003

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.704E-02	0.0940
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.507E-04	0.0005
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.075E-01	0.3737
Pu-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	1.534E-02	0.0533
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.331E-01	0.4626
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.625E-05	0.0003
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	1.723E-03	0.0060
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	4.656E-04	0.0016
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	2.247E-03	0.0078
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	2.876E-01	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	3.802E-04	0.0022	1.005E-02	0.0586	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.055E-06	0.0000
Co-60	1.361E-08	0.0000	7.762E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.848E-15	0.0000
Cs-137	1.803E-02	0.1050	6.551E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.298E-08	0.0000
Pu-238	1.633E-06	0.0000	8.743E-03	0.0509	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.377E-06	0.0000
Pu-239	3.201E-05	0.0002	1.316E-01	0.7666	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.659E-05	0.0004
Sr-90	8.229E-06	0.0000	1.678E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.202E-08	0.0000
U-234	1.878E-06	0.0000	1.065E-03	0.0062	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.400E-07	0.0000
U-235	1.825E-04	0.0011	1.076E-04	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.524E-08	0.0000
U-238	3.498E-04	0.0020	1.016E-03	0.0059	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.420E-07	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	1.898E-02	0.1106	1.526E-01	0.8889	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.639E-05	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+02 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.044E-02	0.0608
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.361E-08	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.803E-02	0.1050
Pu-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	8.749E-03	0.0510
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.317E-01	0.7672
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.919E-06	0.0001
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	1.067E-03	0.0062
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	2.901E-04	0.0017
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	1.366E-03	0.0080
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	1.716E-01	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years
Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

0*Sum of all water independent and dependent pathways.

Dose/Source Ratios Summed Over All Pathways

Parent and Progeny Principal Radionuclide Contributions Indicated

0Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g)									
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+02	1.000E+03	3.000E+02	1.000E+03	3.000E+02	1.000E+03
Am-241	Am-241	1.000E+00	5.702E-03	5.625E-03	5.474E-03	4.977E-03	3.792E-03	1.464E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Am-241	Np-237	1.000E+00	1.763E-09	5.255E-09	1.209E-08	3.444E-08	8.667E-08	1.794E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Am-241	U-233	1.000E+00	3.964E-16	2.759E-15	1.440E-14	1.232E-13	9.158E-13	6.526E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Am-241	Th-229	1.000E+00	1.839E-19	2.748E-18	3.175E-17	8.138E-16	1.807E-14	4.674E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Am-241	SDSR(j)	5.702E-03	5.625E-03	5.474E-03	4.977E-03	3.792E-03	1.464E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0Co-60	Co-60	1.000E+00	5.041E-02	4.415E-02	3.386E-02	1.338E-02	9.421E-04	8.507E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0Cs-137	Cs-137	1.000E+00	1.181E-02	1.152E-02	1.095E-02	9.180E-03	5.541E-03	9.293E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0Pu-238	Pu-238	1.000E+00	4.866E-03	4.827E-03	4.750E-03	4.491E-03	3.825E-03	2.182E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-238	U-234	1.000E+00	2.322E-09	6.919E-09	1.591E-08	4.531E-08	1.134E-07	2.219E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-238	Th-230	1.000E+00	1.723E-14	1.201E-13	6.287E-13	5.433E-12	4.153E-11	3.231E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-238	Ra-226	1.000E+00	1.742E-17	2.601E-16	3.002E-15	7.664E-14	1.679E-12	4.015E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-238	Pb-210	1.000E+00	5.848E-22	1.797E-20	4.437E-19	3.229E-17	1.875E-15	1.164E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-238	Po-210	1.000E+00	8.087E-23	4.117E-21	1.519E-19	1.520E-17	1.000E-15	6.515E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-238	SDSR(j)	4.866E-03	4.827E-03	4.750E-03	4.491E-03	3.825E-03	2.182E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0Pu-239	Pu-239	1.000E+00	5.346E-03	5.346E-03	5.344E-03	5.338E-03	5.322E-03	5.267E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-239	U-235	1.000E+00	2.223E-12	6.647E-12	1.540E-11	4.500E-11	1.214E-10	3.109E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-239	Pa-231	1.000E+00	5.776E-17	4.029E-16	2.113E-15	1.839E-14	1.433E-13	1.188E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-239	Ac-227	1.000E+00	2.497E-18	3.702E-17	4.206E-16	1.015E-14	1.922E-13	3.221E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-239	SDSR(j)	5.346E-03	5.346E-03	5.344E-03	5.338E-03	5.322E-03	5.267E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0Sr-90	Sr-90	1.000E+00	1.007E-04	9.753E-05	9.143E-05	7.292E-05	3.820E-05	3.936E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0U-234	U-234	1.000E+00	1.640E-03	1.629E-03	1.607E-03	1.531E-03	1.334E-03	8.240E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Th-230	1.000E+00	1.826E-08	5.461E-08	1.266E-07	3.707E-07	1.007E-06	2.653E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Ra-226	1.000E+00	2.460E-11	1.716E-10	8.993E-10	7.803E-09	6.024E-08	4.725E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Pb-210	1.000E+00	1.031E-15	1.532E-14	1.750E-13	4.305E-12	8.555E-11	1.612E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Po-210	1.000E+00	1.649E-16	4.002E-15	6.615E-14	2.119E-12	4.642E-11	9.068E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	SDSR(j)	1.640E-03	1.629E-03	1.607E-03	1.532E-03	1.335E-03	8.271E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0U-235	U-235	1.000E+00	4.510E-03	4.478E-03	4.414E-03	4.199E-03	3.641E-03	2.198E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	Pa-231	1.000E+00	1.758E-07	5.246E-07	1.210E-06	3.484E-06	8.996E-06	1.965E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	Ac-227	1.000E+00	1.011E-08	6.969E-08	3.555E-07	2.805E-06	1.683E-05	6.693E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	SDSR(j)	4.510E-03	4.478E-03	4.416E-03	4.206E-03	3.666E-03	2.284E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0U-238	U-238	1.000E+00	2.012E-03	1.998E-03	1.970E-03	1.875E-03	1.629E-03	9.894E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	U-234	1.000E+00	2.323E-09	6.925E-09	1.594E-08	4.558E-08	1.154E-07	2.348E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Th-230	1.000E+00	1.723E-14	1.202E-13	6.295E-13	5.455E-12	4.200E-11	3.348E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Ra-226	1.000E+00	1.742E-17	2.602E-16	3.005E-15	7.687E-14	1.693E-12	4.124E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Pb-210	1.000E+00	5.849E-22	1.797E-20	4.441E-19	3.237E-17	1.888E-15	1.192E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	Po-210	1.000E+00	8.088E-23	4.118E-21	1.520E-19	1.523E-17	1.007E-15	6.668E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	SDSR(j)	2.012E-03	1.998E-03	1.970E-03	1.876E-03	1.629E-03	9.896E-04	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).
\$ is used to indicate summation; the Greek sigma is not included in this font.
The DSR includes contributions from associated (half-life <= 30 days) daughters.

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

ONuclide (j)	Parent (i)	BRF (i)	DOSE(j,t), mrem/yr					
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02
Am-241	Am-241	1.000E+00	4.066E-02	4.011E-02	3.903E-02	3.549E-02	2.704E-02	1.044E-02
Am-241	Am-241	1.000E+00	1.257E-08	3.747E-08	8.617E-08	2.456E-07	6.179E-07	1.279E-06
Am-241	Am-241	1.000E+00	2.826E-15	1.967E-14	1.027E-13	8.786E-13	6.530E-12	4.653E-11
Am-241	Am-241	1.000E+00	1.312E-18	1.959E-17	2.264E-16	5.803E-15	1.288E-13	3.333E-12
Co-60	Co-60	1.000E+00	8.065E-03	7.064E-03	5.418E-03	2.141E-03	1.507E-04	1.361E-08
Co-60	Co-60	1.000E+00	2.291E-01	2.234E-01	2.124E-01	1.781E-01	1.075E-01	1.803E-02
Co-60	Co-60	1.000E+00	1.951E-02	1.936E-02	1.905E-02	1.801E-02	1.534E-02	8.749E-03
Pu-238	Pu-238	1.000E+00	9.310E-09	2.775E-08	6.380E-08	1.817E-07	4.547E-07	8.897E-07
Pu-238	Pu-238	1.000E+00	2.116E-03	2.102E-03	2.073E-03	1.975E-03	1.721E-03	1.063E-03
Pu-238	Pu-238	1.000E+00	3.205E-09	9.557E-09	2.200E-08	6.290E-08	1.592E-07	3.240E-07
U-234	U-234	1.000E+00	2.116E-03	2.102E-03	2.073E-03	1.976E-03	1.722E-03	1.064E-03
U-234	U-234	1.000E+00	6.909E-14	4.816E-13	2.521E-12	2.179E-11	1.665E-10	1.296E-09
U-234	U-234	1.000E+00	2.355E-08	7.044E-08	1.633E-07	4.782E-07	1.299E-06	3.422E-06
U-234	U-234	1.000E+00	2.378E-14	1.658E-13	8.687E-13	7.528E-12	5.797E-11	4.620E-10
U-234	U-234	1.000E+00	2.355E-08	7.044E-08	1.633E-07	4.782E-07	1.299E-06	3.424E-06
U-234	U-234	1.000E+00	6.985E-17	1.043E-15	1.204E-14	3.073E-13	6.732E-12	1.610E-10
U-234	U-234	1.000E+00	3.174E-11	2.213E-10	1.160E-09	1.007E-08	7.771E-08	6.096E-07
U-234	U-234	1.000E+00	2.404E-17	3.591E-16	4.147E-15	1.061E-13	2.337E-12	5.692E-11
U-234	U-234	1.000E+00	3.174E-11	2.213E-10	1.160E-09	1.007E-08	7.772E-08	6.098E-07
U-234	U-234	1.000E+00	2.345E-21	7.204E-20	1.779E-18	1.295E-16	7.519E-15	4.668E-13
U-234	U-234	1.000E+00	1.330E-15	1.977E-14	2.258E-13	5.554E-12	1.104E-10	2.079E-09
U-234	U-234	1.000E+00	8.072E-22	2.480E-20	6.129E-19	4.467E-17	2.606E-15	1.644E-13
U-234	U-234	1.000E+00	1.330E-15	1.977E-14	2.258E-13	5.554E-12	1.104E-10	2.080E-09
U-234	U-234	1.000E+00	3.243E-22	1.651E-20	6.091E-19	6.094E-17	4.010E-15	2.612E-13
U-234	U-234	1.000E+00	2.127E-16	5.163E-15	8.534E-14	2.734E-12	5.988E-11	1.170E-09
U-234	U-234	1.000E+00	1.116E-22	5.683E-21	2.098E-19	2.102E-17	1.390E-15	9.202E-14
U-234	U-234	1.000E+00	2.127E-16	5.163E-15	8.534E-14	2.734E-12	5.988E-11	1.170E-09
U-234	U-234	1.000E+00	1.337E-01	1.336E-01	1.336E-01	1.335E-01	1.331E-01	1.317E-01
U-234	U-234	1.000E+00	5.558E-11	1.662E-10	3.849E-10	1.125E-09	3.035E-09	7.774E-09
U-234	U-234	1.000E+00	5.727E-04	5.687E-04	5.606E-04	5.333E-04	4.624E-04	2.791E-04
U-234	U-234	1.000E+00	5.727E-04	5.687E-04	5.606E-04	5.333E-04	4.624E-04	2.791E-04
U-234	U-234	1.000E+00	1.444E-15	1.007E-14	5.284E-14	4.598E-13	3.583E-12	2.970E-11
U-234	U-234	1.000E+00	2.232E-08	6.662E-08	1.537E-07	4.424E-07	1.143E-06	2.496E-06
U-234	U-234	1.000E+00	2.232E-08	6.662E-08	1.537E-07	4.424E-07	1.143E-06	2.496E-06

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

0Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr			
t=			0.000E+00	1.000E+00	3.000E+00	1.000E+01
Ac-227	Pu-239	1.000E+00	6.243E-17	9.254E-16	1.051E-14	2.538E-13
Ac-227	U-235	1.000E+00	1.285E-09	8.851E-09	4.515E-08	3.562E-07
Ac-227	\$DOSE(j)		1.285E-09	8.851E-09	4.515E-08	3.562E-07
OSr-90	Sr-90	1.000E+00	2.538E-04	2.458E-04	2.304E-04	1.838E-04
OU-238	U-238	1.000E+00	2.777E-03	2.758E-03	2.719E-03	2.588E-03
=====	=====	=====	=====	=====	=====	=====

BRF(i) is the branch fraction of the parent nuclide.
\$ is used to indicate summation; the Greek sigma is not included in this font.

Individual Nuclide Soil Concentration

ONuclide (j)	Parent (i)	BRF(i)	Parent Nuclide and Branch Fraction Indicated S(j,t), pCi/g									
			t=	0.000E+00	1.000E+00	3.000E+00	1.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	Am-241	1.000E+00	7.130E+00	7.034E+00	6.845E+00	6.224E+00	4.742E+00	1.831E+00	1.207E-01	8.870E-06		
Am-241	Am-241	1.000E+00	2.293E+00	6.779E-06	2.149E-05	5.604E-05	1.192E-04	1.345E-04	7.124E-05			
Am-241	Am-241	1.000E+00	0.000E+00	5.017E-12	4.458E-11	4.736E-10	3.756E-09	2.739E-08	8.671E-08	7.772E-08		
Am-241	Am-241	1.000E+00	0.000E+00	1.591E-16	4.253E-15	1.523E-13	3.739E-12	1.009E-10	1.250E-09	7.172E-09		
Co-60	Co-60	1.000E+00	1.600E-01	1.403E-01	1.078E-01	4.285E-02	3.074E-03	3.038E-07	1.095E-18	0.000E+00		
Co-137	Co-137	1.000E+00	1.940E+01	1.893E+01	1.802E+01	1.518E+01	9.295E+00	1.669E+00	1.236E-02	4.319E-10		
Pu-238	Pu-238	1.000E+00	4.010E+00	3.978E+00	3.915E+00	3.701E+00	3.152E+00	1.798E+00	3.615E-01	1.317E-03		
Pu-238	Pu-238	1.000E+00	0.000E+00	1.128E-05	3.335E-05	1.055E-04	2.727E-04	5.398E-04	3.663E-04	6.946E-06		
Pu-234	Pu-234	1.000E+00	1.290E+00	1.281E+00	1.264E+00	1.204E+00	1.049E+00	6.479E-01	1.635E-01	1.319E-03		
U-234	U-234	1.000E+00	0.000E+00	3.885E-06	1.150E-05	3.652E-05	9.547E-05	1.965E-04	1.488E-04	4.005E-06		
U-234	U-234	1.000E+00	1.290E+00	1.281E+00	1.264E+00	1.204E+00	1.050E+00	6.487E-01	1.640E-01	1.330E-03		
U-234	U-234	1.000E+00	0.000E+00	5.091E-11	4.537E-10	4.869E-09	3.972E-08	3.162E-07	1.205E-06	1.826E-06		
Th-230	Th-230	1.000E+00	0.000E+00	1.157E-05	3.448E-05	1.122E-04	3.147E-04	8.387E-04	1.469E-03	1.666E-03		
Th-230	Th-230	1.000E+00	0.000E+00	1.753E-11	1.563E-10	1.682E-09	1.382E-08	1.127E-07	4.535E-07	7.302E-07		
Th-230	Th-230	1.000E+00	0.000E+00	1.157E-05	3.448E-05	1.122E-04	3.147E-04	8.392E-04	1.471E-03	1.669E-03		
Th-230	Th-230	1.000E+00	0.000E+00	7.354E-15	1.967E-13	7.050E-12	1.734E-10	4.663E-09	5.329E-08	1.880E-07		
Ra-226	Ra-226	1.000E+00	0.000E+00	2.506E-09	2.240E-08	2.427E-07	2.034E-06	1.773E-05	8.424E-05	1.780E-04		
Ra-226	Ra-226	1.000E+00	0.000E+00	2.532E-15	6.775E-14	2.433E-12	6.018E-11	1.648E-09	1.968E-08	7.451E-08		
Ra-226	Ra-226	1.000E+00	0.000E+00	2.506E-09	2.240E-08	2.427E-07	2.034E-06	1.774E-05	8.431E-05	1.782E-04		
Ra-226	Ra-226	1.000E+00	0.000E+00	5.682E-17	4.508E-15	5.177E-13	3.432E-11	2.232E-09	4.107E-08	1.725E-07		
Pb-210	Pb-210	1.000E+00	0.000E+00	2.578E-11	6.808E-10	2.337E-08	5.124E-07	9.992E-06	6.922E-05	1.642E-04		
Pb-210	Pb-210	1.000E+00	0.000E+00	1.956E-17	1.552E-15	1.786E-13	1.189E-11	7.863E-10	1.510E-08	6.830E-08		
Pb-210	Pb-210	1.000E+00	0.000E+00	2.578E-11	6.808E-10	2.337E-08	5.124E-07	9.995E-06	6.927E-05	1.644E-04		
Pb-210	Pb-210	1.000E+00	0.000E+00	1.577E-17	2.473E-15	4.187E-13	3.173E-11	2.167E-09	4.039E-08	1.703E-07		
Po-210	Po-210	1.000E+00	0.000E+00	8.495E-12	4.180E-10	1.981E-08	4.820E-07	9.749E-06	6.817E-05	1.621E-04		
Po-210	Po-210	1.000E+00	0.000E+00	5.427E-18	8.516E-16	1.444E-13	1.099E-11	7.631E-10	1.485E-08	6.741E-08		
Po-210	Po-210	1.000E+00	0.000E+00	8.495E-12	4.180E-10	1.982E-08	4.820E-07	9.752E-06	6.823E-05	1.623E-04		
Pu-239	Pu-239	1.000E+00	2.500E+01	2.499E+01	2.496E+01	2.489E+01	2.489E+01	2.463E+01	2.390E+01	2.152E+01		
Pu-239	Pu-239	1.000E+00	0.000E+00	2.454E-08	7.309E-08	2.378E-07	6.658E-07	1.765E-06	3.032E-06	3.144E-06		
U-235	U-235	1.000E+00	1.270E-01	1.261E-01	1.244E-01	1.186E-01	1.033E-01	6.381E-02	1.611E-02	1.302E-04		
U-235	U-235	1.000E+00	1.270E-01	1.261E-01	1.244E-01	1.186E-01	1.033E-01	6.381E-02	1.611E-02	1.333E-04		
Pa-231	Pa-231	1.000E+00	0.000E+00	2.594E-13	2.317E-12	2.504E-11	2.084E-10	1.771E-09	7.842E-09	1.379E-08		
Pa-231	Pa-231	1.000E+00	0.000E+00	2.671E-06	7.921E-06	2.534E-05	6.762E-05	1.497E-04	1.409E-04	9.009E-06		
Pa-231	Pa-231	1.000E+00	0.000E+00	2.671E-06	7.921E-06	2.534E-05	6.762E-05	1.497E-04	1.409E-04	9.023E-06		

Individual Nuclide Soil Concentration										
Parent Nuclide and Branch Fraction Indicated			S(j,t), pCi/g							
ONuclide	Parent	BRF(i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
	(j)	(i)								
Ac-227	Pu-239	1.000E+00	0.000E+00	2.726E-15	7.160E-14	2.412E-12	5.042E-11	8.770E-10	5.238E-09	1.002E-08
Ac-227	U-235	1.000E+00	0.000E+00	4.199E-08	3.643E-07	3.568E-06	2.285E-05	9.318E-05	1.075E-04	7.296E-06
Ac-227	SS(j) :		0.000E+00	4.199E-08	3.643E-07	3.568E-06	2.285E-05	9.318E-05	1.076E-04	7.306E-06
OSr-90	Sr-90	1.000E+00	2.520E+00	2.441E+00	2.291E+00	1.833E+00	9.699E-01	1.045E-01	1.798E-04	3.798E-14
OU-238	U-238	1.000E+00	1.380E+00	1.371E+00	1.352E+00	1.288E+00	1.123E+00	6.934E-01	1.750E-01	1.415E-03

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

S is used to indicate summation; the Greek sigma is not included in this font.

ORESCALC.EXE execution time = 2.79 seconds

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Residual Radioactive Material
Guidelines for CAS 10-09-06

Derivation of Residual Radioactive Material Guidelines for Radionuclides in Soil at
Corrective Action Site (CAS) 10-09-06 of the Corrective Action Unit (CAU) 357 Site, Mud
Pits and Waste Dump, Nevada Test Site, Nevada

February 1, 2005

Work sponsored by U.S. Department of Energy, National Nuclear Security Administration
Nevada Site Office, Environmental Restoration Division, Las Vegas, Nevada.

Introduction

Residual radioactive material guidelines for fission products, activation products, and isotopes of uranium, plutonium, and americium were derived for CAS 10-09-06 located in Area 10 of the NTS. This site became contaminated with fission products, activation products, and isotopes of uranium and plutonium from drilling activities conducted in support of underground nuclear weapons testing at the NTS. Radionuclide specific guidelines were derived to meet the requirement that the TEDE to a hypothetical individual working in the identified areas of contamination at this CAS should not exceed an annual dose of 25 mrem/yr.

The TEDE is defined as the sum of the EDE from external radiation and the CEDE from internal radiation. A dose equivalent is the radiation dose absorbed by a tissue multiplied by a dimensionless quality factor that represents the biological effectiveness of the radiation type (i.e., alpha particles, photons) for causing stochastic biological effects such as cancer or heredity effects. The EDE is the weighted sum of the dose equivalents to different organs and tissues, where the weighing factor is the ratio of the stochastic risk for an individual tissue to the total stochastic risk for all tissue following whole body irradiation. The CEDE is the dose equivalent to organs and tissues that will be received by an individual from an intake of radioactive material during the 50-year period following the intake.

The RESRAD computer code (version 6.22) was developed by Argonne National Laboratory for the DOE. RESRAD implements the dose assessment methodology described in DOE Order 5400.5, "Radiation Protection of the Public and the Environment" (DOE, 1993) and is used to implement residual radioactive material guidelines contained in the order. The exposure scenario selected for this CAS, which is based on the future land use at the site, indicated that the 25-mrem/yr dose constraint would be exceeded for six years unless the site is remediated to the single radionuclide guidelines. The scenario was chosen based on the consideration of all significant exposures to the critical population group via the following pathways:

- Direct exposure to external radiation from the contaminated soil
- Internal dose from inhalation of airborne radionuclides
- Internal dose from ingestion of contaminated soil

Because sitewide residual radioactive material guidelines for fission products, activation products, and isotopes of uranium, and plutonium have not been established for the NTS, guidelines for this CAS have been derived on a site-specific basis. The derived guidelines represent the residual concentrations of the following radionuclides: cobalt-60, cesium-137, plutonium-239, uranium-234, uranium-235, and uranium-238. The radionuclides are assumed to be in a homogeneously contaminated volume at a concentration that must not be exceeded if the dose criterion is not to be exceeded. The radionuclides evaluated for this site were obtained from the sample analysis results associated with the characterization of this CAS. The highest concentration (maximum sampling result) for each detected radionuclide was used for the hot spot analysis, while the average concentration (mean + 95% confidence interval) for each radionuclide was used to perform dose and risk calculations.

Table 1. Input Concentrations for CAS 10-09-06

Dose Calculation		Hot Spot Calculation	
Radionuclide	Average Activity Concentration (pCi/g)	Radionuclide	Maximum Activity Concentration (pCi/g)
Cobalt-60	9.567E+01	Cobalt-60	1.400E+02
Cesium-137	4.600E-01	Cesium-137	4.600E-01
Plutonium-239	2.800E-01	Plutonium-239	2.510E-01
Uranium-234	1.100E+00	Uranium-234	1.090E+00
Uranium-235	9.000E-01	Uranium-235	8.000E-02
Uranium-238	1.090E+00	Uranium-238	1.100E+00

The scenario for this CAS addresses long-term exposure to workers exposed to residual levels of radionuclides in soil during an average workday outdoors onsite and that at some time within 1,000 years the site will be released for use without radiological restrictions following remediation.

The scenario assumes that a worker will be on the site for a total of 335 hours per year for a duration of 25 years. The indoor time is zero. The outdoor time fraction was determined by $335/8760 = 0.038$. The worker exposures are limited to working hours and do not include contributions from ingestion of drinking water, plant foods, meat or fish taken from the immediate area. The exposure pathways considered are summarized in Table 2.

Table 2. Summary of Pathways Considered

Pathway	Dose Calculation	Hot Spot Calculation
External exposure	Yes	Yes
Particulate inhalation	Yes	Yes
Radon inhalation	No	No
Ingestion of soil	Yes	Yes
Ingestion of produce from on-site garden	No	No
Ingestion of meat from on-site livestock	No	No
Ingestion of milk from on-site livestock	No	No
Ingestion of fish from on-site pond	No	No
Ingestion of water from on-site well	No	No

The RESRAD computer code, version 6.22, was used to calculate the dose/source concentration ratios $DSRip(t)$ for all identified radionuclides (i) and pathway (p) at time (t) after remediation. The period considered in this analysis was 1,000 years. Radioactive decay and ingrowth were considered in deriving the dose/source concentration ratios. The various parameters used in the RESRAD code for this analysis are listed in Appendix A. The calculated maximum dose contributions for all considered pathways are presented in Tables 3 and 4 and the dose/source concentration ratios summed over all pathways are presented in Table 5. The maximum dose contributions and total dose/source concentration ratios for CAS-10-09-06 are predicted to occur at time zero. The dose contributions are based on the average (mean plus the 95 percent confidence interval) radionuclide activity concentration and a 30 by 40 meter contamination area. The size of the area chosen for the dose calculation bounds the identified contamination area within this CAS (Figure 1). The data used to calculate the average dose scenario are provided as Exhibit 1.

Uncertainty in the derivation of dose contributions and dose/source concentration ratios comes from the distribution of possible input parameter values, as well as uncertainty in the conceptual model used to represent the site. The external exposure and particulate inhalation pathways contribute greater than 99 percent of the dose. Therefore, uncertainties in the following parameters — occupancy factors, thickness of the contaminated zone, mass loading, and inhalation rate — have the greatest significance on the model predictions.

Figure 1

CAU 357

Mud Pits and Waste Dump

CAS 10-09-06

Mud Pit ; Stains; Material U-10am #5

Department of Energy - Nevada Test Site			
CAS 10-09-06			
Mud Pit ; Stains; Material U-10am			
Contoured Radiological Survey Data			
Drawn	Checked	Approved	
A. Martinez	B. Nicosia	S. Alderson	
Date	Date	Date	
4/08/04	12 / 22 / 2004	12 / 22 / 2004	
Job No.	File		
DP04-090	Plot2.srf		
Radiation Services			

Scale (meters)

Average Background In Counts Per Second (CPS) 213
Observed Count Rate Multiples of Background

2 x bkg 426 CPS
3 x bkg 639 CPS
4 x bkg 852 CPS
5 x bkg 1065 CPS

Coordinates in UTM 11 North
NAD 1927 (WESTERN), meters

Table 3. Maximum Dose Contributions for CAS 10-09-06 (occurs at t = 0)

Maximum Dose Contributions (mrem/yr)									
Ground			Inhalation			Soil			Total
Radionuclide	mrem/yr	Fraction	mrem/yr	Fraction	mrem/yr	mrem/yr	Fraction	mrem/yr	Fraction
Cobalt-60	4.949E+01	9.980E-01	5.279E-04	0.000E+00	1.842E-03	0.000E+00	0.000E+00	4.949E+01	9.980E-01
Cesium-137	5.241E-02	1.100E-03	3.900E-07	0.000E+00	1.737E-05	0.000E+00	0.000E+00	5.243E-02	1.100E-03
Plutonium-239	2.917E-06	0.000E+00	3.230E-03	1.000E-04	7.571E-04	0.000E+00	0.000E+00	3.990E-03	1.000E-04
Uranium-234	1.564E-05	0.000E+00	3.904E-03	1.000E-04	2.377E-04	0.000E+00	0.000E+00	4.157E-03	1.000E-04
Uranium-235	2.374E-02	5.000E-04	2.977E-03	1.000E-04	1.836E-04	0.000E+00	0.000E+00	2.690E-02	5.000E-04
Uranium-238	5.669E-03	1.000E-04	3.458E-03	1.000E-04	2.239E-04	0.000E+00	0.000E+00	9.351E-03	2.000E-04
Total	4.957E+01	9.997E-01	1.410E-02	3.000E-04	3.262E-03	1.000E-04	1.000E-04	4.959E+01	1.000E+00

Table 4. Maximum Dose/Source Concentration Ratios Summed Over All Pathways

Summed Dose/Source Concentration Ratios (DSR) at Time t = 0.0 Years	
Radionuclide	DSR (mrem/yr)/(pCi/g)
Cobalt-60	5.173E-01
Cesium-137	1.140E-01
Plutonium-239	1.425E-02
Uranium-234	3.779E-03
Uranium-235	2.989E-02
Uranium-238	8.579E-03

RESRAD default parameters were used where site-specific data was not available. The default values are based on national averages or reasonable maximum values. The contaminated zone thickness of 0.61 meters with no cover was used to derive the dose contribution and is based on the results of the soil sampling. The calculated dose contributions and dose/source concentration ratios are conservative because in reality contamination is rarely distributed uniformly, but rather occurs in localized areas.

The residual radioactive material guideline represents the concentration of residual radioactive material that can remain in place and still allow use of that area without radiological restrictions. The radioactive material guideline, G, can be calculated given a dose limit of H_{EL} for an individual as follows:

$$G = H_{EL} / DSR$$

where DSR is the total dose/source concentration ratio listed in Table 4. The dose limit H_{EL} , used to derive the residual radioactive material guideline, is 25 mrem/yr. The calculated residual radioactive material guidelines for individual radionuclides are presented in Table 5.

Table 5. Residual Radioactive Material Guidelines For CAS 10-09-06

Radionuclide	Guideline (pCi/g)
Cobalt-60	4.832E+01
Cesium-137	2.193E+02
Plutonium-239	1.754E+03
Uranium-234	6.615E+03
Uranium-235	8.365E+02
Uranium-238	2.914E+03

The derived guidelines presented in Table 5 apply to a large, homogeneously contaminated area. For a small, isolated area of contamination (i.e., hot spots), the allowable concentration that can remain on site may be higher than what is allowed by the homogeneous area guideline due to the averaging process. To evaluate the potential for greater exposure to individuals using a site contaminated with hot spots versus a site that is homogeneously contaminated, the following hot spot criterion must be applied. The hot spot soil guideline G_i , can be calculated with RESRAD by using the area of the hot spot or can be conservatively estimated on a single radionuclide bases for field applications by using the following:

$$G_i = G_i(t_m) \times (100 / A)^{1/2}$$

where:

$G_i(t_m)$ = the single radionuclide soil guideline in a homogeneously contaminated zone
 A = area of hot spot (m^2).

The RESRAD code was used to calculate hot spot guideline values for the following hot spot areas: 100 m^2 , 10 m^2 , and 1 m^2 (Exhibits 2, 3, and 4). The initial radionuclide concentrations used were the maximum results and would represent the worst-case radionuclide ratio. The results for these calculations are presented in Table 6.

Table 6. Calculated Hot Spot Guidelines For CAS 10-09-06

Guidelines (pCi/g), by Size of Hot Spot			
Radionuclide	100 m^2	10 m^2	1 m^2
Cobalt-60	5.504E+01	9.449E+01	4.378E+02
Cesium-137	2.484E+02	4.208E+02	1.913E+03
Plutonium-239	2.740E+03	3.614E+03	4.676E+03
Uranium-234	9.088E+03	1.177E+04	1.521E+04
Uranium-235	9.525E+02	1.547E+03	5.296E+03
Uranium-238	3.554E+03	5.428E+03	1.208E+04

The hot spot criteria can be used as long as the average radionuclide concentration for any 100 m^2 does not exceed the homogeneous residual radioactive material guidelines. A review of the radioanalytical data has identified that cobalt-60 is the most limiting radionuclide in the averaging calculation. Therefore, it is recommended that any hot spots be remediated to the 100- m^2 cobalt-60 guideline level for ALARA purposes.

The following graphs identify the dose contribution and excess cancer risk for each radionuclide summed across all pathways for this CAS. The EPA generally sets site-specific remediation levels for carcinogens at a level that represents an excess upper-bound lifetime cancer risk to an individual of between 1×10^{-4} to 1×10^{-6} . The “upper boundary of risk range is not a discrete line at 1×10^{-4} , although EPA generally uses 1×10^{-4} in making risk management decisions. A specific risk estimate around 10^{-4} may be considered acceptable if justified based on site-specific conditions.” (EPA, 1991).

Figures 2 and 3 represent the total dose rate per year and total excess cancer risk summed across all pathways for an individual under the scenario for this CAS. At time zero, the total dose rate per year to an individual on site is 50 mrem/year and the total excess cancer risk to the same individual is 1.012×10^{-3} . Remediation of discrete areas of elevated radiological contamination is warranted under the CAS 10-09-06 scenario. If the site is not remediated, after six years due to the radioactive decay process, the total dose rate per year will be less than 23 mrem/yr, which is below the 25-mrem/yr dose constraint. Because the site contains areas of elevated radiological contamination, as a best management practice of ALARA, these discrete areas of elevated radiological contamination should be remediated to the appropriate guideline levels in Table 6.

Figure 2 CAS 10-09-06: Dose Rate Per Year Summed Across All Pathways

DOSE: All Nuclides Summed, All Pathways Summed

CAU357-CAS 100906 Average Parcel.RAD 01/31/2005 07:49 Includes All Pathways

Figure 3 CAS 10-09-06: Excess Cancer Risk Per Year Summed Across All Pathways

CAU357-CAS 100906 Average Parcel.RAD 01/31/2005 07:49 Includes All Pathways

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Attachment A

Scenarios and Parameters Used for Analysis of CAS 10-09-06

The exposure scenario for CAS 10-09-06 addresses long-term exposure to workers exposed to residual levels of radionuclides in soil during an average workday outdoors onsite. This scenario used the following parameters:

Assumes a low occupancy activity at the site.

Workers will be on site 335 hours per year (335 site-hrs/yr) for 25 years.

The indoor time fraction is zero.

The outdoor time fraction is 0.038.

The worker exposures are limited to working hours and do not include contributions from ingestion of drinking water, plant foods, meat, or fish taken from the immediate area.

The parametric values used in the RESRAD code for the analysis of this site are listed in Table A.1. Some parameters are site specific, while other values are the default RESRAD values. The dose conversion factors used for inhalation and ingestion were the default FGR 11 values. The FRG 13 morbidity values were used for the risk slope factor and correspond to the guidance and recommendations per the memorandum from A. Lawrence, Office of Environmental Policy & Guidance, to Distribution, titled *Radiation Risk Estimation from Total Effective Dose Equivalents* (TEDEs) (EH-412-2002-1, August 9, 2002).

Table A.1 RESRAD Parameters Used for 25 mrem/yr Analysis of CAS 10-09-06

Parameter	Units	CAS 10-09-06	Hot Spot	Defaults	Reference/Rationale
R011 Contaminated Zone					
Area of Contaminated Zone	m ²	1.200E+03	100, 10, 1	1.000E+04	Area of contamination and hot spot area
Thickness of Contaminated Zone	m	6.100E-01	6.100E-01	2.000E+00	Based on sampling data
Length Parallel to Aquifer Flow	m	not used	not used	1.000E+02	
Radiation Dose Limit	mrem/yr	25	25	2.5E+001	
Elapsed Time Since Placement of Material	yr	0.0	0.0	0.0	
R012 Initial Principal Radionuclide					
Cobalt-60 (soil)	pCi/g	9.567E+01	1.400E+02	0.0	CAS 10-09-06 soil sampling results
Cesium-137 (soil)	pCi/g	4.600E-01	4.600E-01	0.0	CAS 10-09-06 soil sampling results
Plutonium-239 (soil)	pCi/g	2.800E-01	2.510E-01	0.0	CAS 10-09-06 soil sampling results
Uranium-234 (soil)	pCi/g	1.100E+00	1.090E+00	0.0	CAS 10-09-06 soil sampling results
Uranium-235 (soil)	pCi/g	9.000 E-01	8.000E+0-2	0.0	CAS 10-09-06 soil sampling results
Uranium-238 (soil)	pCi/g	1.090 E+00	1.100E+00	0.0	CAS 10-09-06 soil sampling results

Table A.1 RESRAD Parameters Used for 25 mrem/yr Analysis of CAS 10-09-06 Cont.

Parameter	Units	CAS 10-09-06	Hot Spot	Defaults	Reference/Rationale
R013 Cover and Contaminated Zone Hydrological Data					
Cover Depth	m	0.0	0.0	0.0	No Cover Assumed
Density of Cover Material	g/cm ³	not used	not used	1.5	No Cover Assumed
Cover Depth Erosion Rate	m/yr	not used	not used	1.000E-03	No Cover Assumed
Density of Contaminated Zone	g/cm ³	1.5	1.5	1.5	
Contamination Zone Erosion Rate	m/yr	1.000E-03	1.000E-03	1.000E-03	
Contaminated Zone Total Porosity	-	4.000E-01	4.000E-01	4.000E-01	
Contaminated Zone Field Capacity	-	2.000E-01	2.000E-01	2.000E-01	
Contaminated Zone Hydraulic Conductivity	m/yr	1.000E+01	1.000E+01	1.000E+01	
Contaminated Zone b Parameter	-	5.300E+00	5.300E+00	5.300E+00	
Average Annual Wind Speed	m/sec	3.5	3.5	2.000E+00	Data from Air Resource Laboratory
Humidity in Air	g/m ³	not used	not used	8.000E+00	
Evapotranspiration Coefficient	-	5.000E-01	5.000E-01	5.000E-01	
Precipitation	m/yr	3.000E+-2	3.000E+-2	1.000E+00	Data from Air Resources Laboratory
Irrigation	m/yr	0.000E-00	2.000E-01	2.000E-01	
Irrigation Mode	-	overhead	overhead	overhead	
Runoff Coefficient	-	4.000E-01	4.000E-01	2.000E-01	
Watershed Area for Nearby Stream or Pond	m ²	not used	not used	1.000E+06	
Accuracy for Water/Soil Computations	-	not used	not used	1.000E-03	

Table A.1 RESRAD Parameters Used for 25 mrem/yr Analysis of CAS 10-09-06 Cont.

Parameter	Units	CAS 10-09-06	Hot Spot	Defaults	Reference/Rationale
R014 Saturated Zone Hydrological Data					
Density of Saturated Zone	g/cm ³	not used	not used	1.500E+00	
Saturated Zone Total Porosity	-	not used	not used	4.000E-01	
Saturated Zone Effective Porosity	-	not used	not used	2.000E-01	
Saturated Zone Field Capacity	-	not used	not used	2.000E-01	
Saturated Zone Hydraulic Conductivity	m/yr	not used	not used	1.000E+02	
Saturated Zone Hydraulic Gradient	-	not used	not used	2.000E-02	
Saturated Zone b Parameter	-	not used	not used	5.300E+00	
Water Table Drop Rate	m/yr	not used	not used	1.000E-03	
Well Pump Intake Depth	m	not used	not used	1.000E+01	
Model: Nondispersion or Mass-Balance	-	not used	not used	ND	
Well Pumping Rate	m ³ /yr	not used	not used	2.500E+02	
R015 Uncontaminated and Unsaturated Strata Hydrological Data					
Number of Unsaturated Zone Strata	-	not used	not used	1	
Thickness	m	not used	not used	4.000E+00	
Soil Density	g/cm ³	not used	not used	1.500E+00	
Total Porosity	-	not used	not used	4.000E-01	
Effective Porosity	-	not used	not used	2.000E-01	
Field Capacity	-	not used	not used	2.000E-01	
Soil-specific b Parameter	-	not used	not used	5.300E+00	
Hydraulic Conductivity	m/yr	not used	not used	1.000E+01	

Table A.1 RESRAD Parameters Used for 25 mrem/yr Analysis of CAS 10-09-06 Cont.

Parameter	Units	CAS 10-09-06	Hot Spot	Defaults	Reference/Rationale
R016 Distribution Coefficients and Leach Rates					
Contaminated Zone K_d (all Zones)	cm^3/g	1.000E+03	1.000E+03	1.000E+03	Default or a lower value given in RESRAD
Cobalt Radionuclides		1.700E+02	1.700E+02	1.000E+03	
Cesium Radionuclides		2.000E+03	2.000E+03	2.000E+03	
Plutonium Radionuclides		3.500E+01	3.500E+01	5.000E+01	
Uranium Radionuclides					
Saturated Leach Rate	/yr	0.0	0.0	0.0	
Solubility Constant	-	0.0	0.0	0.0	
R017 Inhalation and External Gamma					
Inhalation Rate	m^3/yr	1.230E+04	1.230E+04	8.400E+03	
Mass Loading for Inhalation	g/m^3	6.000E-04	6.000E-04	1E-04	
Exposure Duration	yr	25	25	30	Estimated
Shielding Factor Inhalation	-	1	1	0.4	
Shielding Factor External Gamma	-	1	1	0.7	
Fraction of Time Spent Indoors	-	0.0	0.0	0.5	Estimated
Fraction of Time Spent Outdoors	-	0.038	0.038	0.25	Estimated
Shape Factor	-	1.0	1.0	1.0	
R018 Ingestion Pathway Data, Dietary Parameters					
Fruits, Vegetables, and Grain Consumption	kg/yr	not used	not used	1.600E+02	
Leafy Vegetable Consumption	kg/yr	not used	not used	1.400E+01	
Milk Consumption	L/yr	not used	not used	9.200E+01	
Meat and Poultry Consumption	kg/yr	not used	not used	6.300E+01	

Table A.1 RESRAD Parameters Used for 25 mrem/yr Analysis of CAS 10-09-06 Cont.

Parameter	Units	CAS 10-09-06	Hot Spot	Defaults	Reference/Rationale
Fish Consumption	kg/yr	not used	not used	5.400E+00	
Other Seafood Consumption	kg/yr	not used	not used	9.000E-01	
Soil Ingestion Rate	g/yr	20.1	20.1	36.5	EPA 1991, 480 mg/day
Drinking Water Intake	L/yr	not used	not used	5.100E+02	
Drinking Water Contaminated Fraction	-	not used	not used	1.000E+00	
Household Water Contaminated Fraction	-	not used	not used	1.000E+00	
Livestock Water Contaminated Fraction	-	not used	not used	1.000E+00	
Irrigation Water Contaminated Fraction	-	not used	not used	1.000E+00	
Aquatic Food Contamination Fraction	-	not used	not used	5.000E-01	
Plant Food Contamination Fraction	-	not used	not used	-1	
Meat Contamination Fraction	-	not used	not used	-1	
Milk Contamination Fraction	-	not used	not used	-1	
R019 Ingestion Pathway Data, Nondietary					
Livestock Fodder Intake for Meat	kg/day	not used	not used	6.800E+01	
Livestock Fodder Intake for Milk	kg/day	not used	not used	5.500E+01	
Livestock Water Intake for Meat	L/day	not used	not used	5.000E+01	
Livestock Water Intake for Milk	L/day	not used	not used	1.600E+02	
Livestock Soil Intake	kg/day	not used	not used	5.000E-01	
Mass Loading for Foliar Deposition	g/m ³	not used	not used	1.000E-04	
Depth of Soil Mixing layer	m	1.500E-01	1.500E-01	1.500E-01	
Depth of Roots	m	not used	not used	9.000E-01	

Table A.1 RESRAD Parameters Used for 25 mrem/yr Analysis of CAS 10-09-06 Cont.

Parameter	Units	CAS 10-09-06	Hot Spot	Defaults	Reference/Rationale
Drinking Water Fraction from Groundwater	-	not used	not used	1.000E+00	
Household Water Fraction from Groundwater	-	not used	not used	1.000E+00	
Livestock Water Fraction from Groundwater	-	not used	not used	1.000E+00	
Irrigation Fraction from Groundwater	-	not used	not used	1.000E+00	
R021 Radon					
Radon Parameters Not Used					

Exhibit 1

RESRAD Scenario CAS 10-09-06 Average Dose

(23 Pages)

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines
=====

Dose Conversion Factor (and Related) Parameter Summary ...	2
Site-Specific Parameter Summary	5
Summary of Pathway Selections	10
Contaminated Zone and Total Dose Summary	11
Total Dose Components	
Time = 0.000E+00	12
Time = 1.000E+00	13
Time = 6.000E+00	14
Time = 1.000E+01	15
Time = 3.000E+01	16
Time = 1.000E+02	17
Time = 3.000E+02	18
Time = 1.000E+03	19
Dose/Source Ratios Summed Over All Pathways	20
Single Radionuclide Soil Guidelines	21
Dose Per Nuclide Summed Over All Pathways	22
Soil Concentration Per Nuclide	23

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

0	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	Co-60		2.190E-04	2.190E-04	DCF2 (2)
B-1	Cs-137+D		3.190E-05	3.190E-05	DCF2 (3)
B-1	Pa-231		1.280E+00	1.280E+00	DCF2 (4)
B-1	Pb-210+D		1.380E-02	1.380E-02	DCF2 (5)
B-1	Po-210		9.400E-03	9.400E-03	DCF2 (6)
B-1	Pu-239		4.290E-01	4.290E-01	DCF2 (7)
B-1	Ra-226+D		8.600E-03	8.600E-03	DCF2 (8)
B-1	Th-230		3.260E-01	3.260E-01	DCF2 (9)
B-1	U-234		1.320E-01	1.320E-01	DCF2 (10)
B-1	U-235+D		1.230E-01	1.230E-01	DCF2 (11)
B-1	U-238+D		1.180E-01	1.180E-01	DCF2 (12)
D-1	Dose conversion factors for ingestion, mrem/pCi:				
D-1	AC-227+D		1.480E-02	1.480E-02	DCF3 (1)
D-1	Co-60		2.690E-05	2.690E-05	DCF3 (2)
D-1	Cs-137+D		5.000E-05	5.000E-05	DCF3 (3)
D-1	Pa-231		1.060E-02	1.060E-02	DCF3 (4)
D-1	Pb-210+D		5.370E-03	5.370E-03	DCF3 (5)
D-1	Po-210		1.900E-03	1.900E-03	DCF3 (6)
D-1	Pu-239		3.540E-03	3.540E-03	DCF3 (7)
D-1	Ra-226+D		1.330E-03	1.330E-03	DCF3 (8)
D-1	Th-230		5.480E-04	5.480E-04	DCF3 (9)
D-1	U-234		2.830E-04	2.830E-04	DCF3 (10)
D-1	U-235+D		2.670E-04	2.670E-04	DCF3 (11)
D-1	U-238+D		2.690E-04	2.690E-04	DCF3 (12)
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	Co-60 , plant/soil concentration ratio, dimensionless		8.000E-02	8.000E-02	RTF (2,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		2.000E-02	2.000E-02	RTF (2,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)		2.000E-03	2.000E-03	RTF (2,3)
D-34					
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless		4.000E-02	4.000E-02	RTF (3,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		3.000E-02	3.000E-02	RTF (3,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)		8.000E-03	8.000E-03	RTF (3,3)
D-34					
D-34	Pa-231 , plant/soil concentration ratio, dimensionless		1.000E-02	1.000E-02	RTF (4,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		5.000E-03	5.000E-03	RTF (4,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)		5.000E-06	5.000E-06	RTF (4,3)
D-34					
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless		1.000E-02	1.000E-02	RTF (5,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		8.000E-04	8.000E-04	RTF (5,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)		3.000E-04	3.000E-04	RTF (5,3)
D-34					

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

File: FGR 13 Morbidity

0	Menu	Parameter	Current Value	Default	Parameter Name
D-34	Po-210	plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (6,1)
D-34	Po-210	beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF (6,2)
D-34	Po-210	milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.400E-04	3.400E-04	RTF (6,3)
D-34					
D-34	Pu-239	plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (7,1)
D-34	Pu-239	beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF (7,2)
D-34	Pu-239	milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF (7,3)
D-34					
D-34	Ra-226+D	plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF (8,1)
D-34	Ra-226+D	beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF (8,2)
D-34	Ra-226+D	milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF (8,3)
D-34					
D-34	Th-230	plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF (9,1)
D-34	Th-230	beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF (9,2)
D-34	Th-230	milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF (9,3)
D-34					
D-34	U-234	plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF (10,1)
D-34	U-234	beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF (10,2)
D-34	U-234	milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF (10,3)
D-34					
D-34	U-235+D	plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF (11,1)
D-34	U-235+D	beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF (11,2)
D-34	U-235+D	milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF (11,3)
D-34					
D-34	U-238+D	plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF (12,1)
D-34	U-238+D	beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF (12,2)
D-34	U-238+D	milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF (12,3)
D-5					
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	Co-60, fish		3.000E+02	3.000E+02	BIOFAC (2,1)
D-5	Co-60, crustacea and mollusks		2.000E+02	2.000E+02	BIOFAC (2,2)
D-5					
D-5	Cs-137+D, fish		2.000E+03	2.000E+03	BIOFAC (3,1)
D-5	Cs-137+D, crustacea and mollusks		1.000E+02	1.000E+02	BIOFAC (3,2)
D-5					
D-5	Pa-231, fish		1.000E+01	1.000E+01	BIOFAC (4,1)
D-5	Pa-231, crustacea and mollusks		1.100E+02	1.100E+02	BIOFAC (4,2)
D-5					
D-5	Pb-210+D, fish		3.000E+02	3.000E+02	BIOFAC (5,1)
D-5	Pb-210+D, crustacea and mollusks		1.000E+02	1.000E+02	BIOFAC (5,2)
D-5					
D-5	Po-210, fish		1.000E+02	1.000E+02	BIOFAC (6,1)
D-5	Po-210, crustacea and mollusks		2.000E+04	2.000E+04	BIOFAC (6,2)
D-5					
D-5	Pu-239, fish		3.000E+01	3.000E+01	BIOFAC (7,1)
D-5	Pu-239, crustacea and mollusks		1.000E+02	1.000E+02	BIOFAC (7,2)
D-5					

Site-Specific Parameter Summary						
Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
0						
R011	Area of contaminated zone (m**2)	1.200E+03	1.000E+04		---	AREA
R011	Thickness of contaminated zone (m)	6.100E-01	2.000E+00		---	THICKO
R011	Length parallel to aquifer flow (m)	not used	1.000E+02		---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	2.500E+01		---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00		---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00		---	T (2)
R011	Times for calculations (yr)	6.000E+00	3.000E+00		---	T (3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01		---	T (4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01		---	T (5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02		---	T (6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02		---	T (7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03		---	T (8)
R011	Times for calculations (yr)	not used	0.000E+00		---	T (9)
R011	Times for calculations (yr)	not used	0.000E+00		---	T (10)
R012	Initial principal radionuclide (pCi/g): Co-60	9.567E+01	0.000E+00		---	S1 (2)
R012	Initial principal radionuclide (pCi/g): Cs-137	4.600E-01	0.000E+00		---	S1 (3)
R012	Initial principal radionuclide (pCi/g): Pu-239	2.800E-01	0.000E+00		---	S1 (7)
R012	Initial principal radionuclide (pCi/g): U-234	1.100E+00	0.000E+00		---	S1(10)
R012	Initial principal radionuclide (pCi/g): U-235	9.000E-01	0.000E+00		---	S1(11)
R012	Initial principal radionuclide (pCi/g): U-238	1.090E+00	0.000E+00		---	S1(12)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00		---	W1 (2)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00		---	W1 (3)
R012	Concentration in groundwater (pCi/L): Pu-239	not used	0.000E+00		---	W1 (7)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00		---	W1(10)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00		---	W1(11)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00		---	W1(12)
R013	Cover depth (m)	0.000E+00	0.000E+00		---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00		---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03		---	VCV
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00		---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03		---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01		---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01		---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01		---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00		---	BCZ
R013	Average annual wind speed (m/sec)	3.500E+00	2.000E+00		---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00		---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01		---	EVAPTR
R013	Precipitation (m/yr)	3.000E-02	1.000E+00		---	PRECIP
R013	Irrigation (m/yr)	0.000E+00	2.000E-01		---	RI
R013	Irrigation mode	overhead	overhead		---	IDITCH
R013	Runoff coefficient	4.000E-01	2.000E-01		---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	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

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
0					
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
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(2)
R016	Unsat. zone 1 (cm**3/g)	not used	1.000E+03	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+03	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.834E-06 not used	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00		SOLUBK(2)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	1.700E+02	1.000E+03	---	DCNUCC(3)
R016	Unsat. zone 1 (cm**3/g)	not used	1.000E+03	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+03	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.781E-05 not used	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00		SOLUBK(3)
R016	Distribution coefficients for Pu-239				
R016	Contaminated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCC(7)
R016	Unsat. zone 1 (cm**3/g)	not used	2.000E+03	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+03	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.918E-06 not used	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00		SOLUBK(7)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	3.500E+01	5.000E+01	---	DCNUCC(10)
R016	Unsat. zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(10,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(10)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.798E-04 not used	ALEACH(10)
R016	Solubility constant	0.000E+00	0.000E+00		SOLUBK(10)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
0						
R016	Distribution coefficients for U-235					
R016	Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC (11)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (11,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		2.798E-04	ALEACH (11)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (11)
R016	Distribution coefficients for U-238					
R016	Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC (12)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (12,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (12)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		2.798E-04	ALEACH (12)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (12)
R016	Distribution coefficients for daughter Ac-227					
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01		---	DCNUCC (1)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+01		---	DCNUCU (1,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+01		---	DCNUCS (1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		4.879E-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)	5.000E+01	5.000E+01		---	DCNUCC (4)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (4,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		1.961E-04	ALEACH (4)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (4)
R016	Distribution coefficients for daughter Pb-210					
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02		---	DCNUCC (5)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+02		---	DCNUCU (5,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+02		---	DCNUCS (5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		9.820E-05	ALEACH (5)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (5)
R016	Distribution coefficients for daughter Po-210					
R016	Contaminated zone (cm**3/g)	1.000E+01	1.000E+01		---	DCNUCC (6)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+01		---	DCNUCU (6,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+01		---	DCNUCS (6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		9.682E-04	ALEACH (6)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (6)
R016	Distribution coefficients for daughter Ra-226					
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01		---	DCNUCC (8)
R016	Unsaturated zone 1 (cm**3/g)	not used	7.000E+01		---	DCNUCU (8,1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01		---	DCNUCS (8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00		1.402E-04	ALEACH (8)
R016	Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (8)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
0					
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUC (9)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUC (9,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS (9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.639E-07	ALEACH (9)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK (9)
R017	Inhalation rate (m**3/yr)	1.230E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	6.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	2.500E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	1.000E+00	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	1.000E+00	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	3.800E-02	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)	2.010E+01	3.650E+01	---	SOIL

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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	---	LF15
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LF16
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	---	RDY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDY(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
C14	DCF correction factor for gaseous forms of C14	not used	8.894E+01	---	CO2F

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
0					
STOR	Storage times of contaminated foodstuffs (days) :				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec) :				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	1	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	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	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	1200.00 square meters	Co-60	9.567E+01
Thickness:	0.61 meters	Cs-137	4.600E-01
Cover Depth:	0.00 meters	Pu-239	2.800E-01
		U-234	1.100E+00
		U-235	9.000E-01
		U-238	1.090E+00

0

Total Dose TDose(t), mrem/yr	
Basic Radiation Dose Limit = 2.500E+01 mrem/yr	
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)	
t (years):	0.000E+00
TDose(t):	4.959E+01
M(t):	1.984E+00
Maximum TDose(t): 4.959E+01 mrem/yr at t = 0.000E+00 years	

6.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
2.257E+01	1.337E+01	1.027E+00	4.898E-02	4.322E-02	0.000E+00
9.029E-01	5.348E-01	4.110E-02	1.959E-03	1.729E-03	0.000E+00

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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	4.949E+01	0.9980	5.279E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.842E-03	0.0000
Cs-137	5.241E-02	0.0011	3.900E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.737E-05	0.0000
Pu-239	2.917E-06	0.0000	3.230E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.571E-04	0.0000
U-234	1.564E-05	0.0000	3.904E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.377E-04	0.0000
U-235	2.374E-02	0.0005	2.977E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.836E-04	0.0000
U-238	5.669E-03	0.0001	3.458E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.239E-04	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	4.957E+01	0.9997	1.410E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.262E-03	0.0001

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.949E+01	0.9980
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.243E-02	0.0011
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.990E-03	0.0001
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-03	0.0001
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	2.690E-02	0.0005
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	9.351E-03	0.0002
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	4.959E+01	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+00 Years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	4.339E+01	0.9978	4.629E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.615E-03	0.0000
Cs-137	5.121E-02	0.0012	3.811E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.697E-05	0.0000
Pu-239	2.917E-06	0.0000	3.230E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.570E-04	0.0000
U-234	1.564E-05	0.0000	3.903E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.377E-04	0.0000
U-235	2.373E-02	0.0005	2.977E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.837E-04	0.0000
U-238	5.667E-03	0.0001	3.457E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.239E-04	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	4.347E+01	0.9996	1.403E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.034E-03	0.0001

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.339E+01	0.9978
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.123E-02	0.0012
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.990E-03	0.0001
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	4.156E-03	0.0001
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	2.689E-02	0.0006
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	9.348E-03	0.0002
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	4.349E+01	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 6.000E+00 Years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	2.248E+01	0.9960	2.398E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.367E-04	0.0000
Cs-137	4.561E-02	0.0020	3.394E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.511E-05	0.0000
Pu-239	2.916E-06	0.0000	3.229E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.569E-04	0.0000
U-234	1.565E-05	0.0000	3.898E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.374E-04	0.0000
U-235	2.370E-02	0.0010	2.978E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.843E-04	0.0000
U-238	5.659E-03	0.0003	3.452E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.236E-04	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	2.256E+01	0.9993	1.380E-02	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.254E-03	0.0001
0														

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

As mrem/yr and Fraction of Total Dose At t = 6.000E+00 Years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.248E+01	0.9960
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.563E-02	0.0020
Pu-239	0.000E+00	0.0000	0.000E+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-03	0.0002
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.151E-03	0.0002
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	2.686E-02	0.0012
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	9.335E-03	0.0004
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	2.257E+01	1.0000
0*Sum of all water independent and dependent pathways.														

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

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

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	1.328E+01	0.9935	1.417E-04	0.0000	0.0000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.944E-04	0.0000
Cs-137	4.157E-02	0.0031	3.094E-07	0.0000	0.0000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.378E-05	0.0000
Pu-239	2.916E-06	0.0000	3.229E-03	0.0002	0.0000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.568E-04	0.0001
U-234	1.569E-05	0.0000	3.894E-03	0.0003	0.0000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.371E-04	0.0000
U-235	2.367E-02	0.0018	2.980E-03	0.0002	0.0000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.850E-04	0.0000
U-238	5.653E-03	0.0004	3.449E-03	0.0003	0.0000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.233E-04	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	1.336E+01	0.9988	1.369E-02	0.0010	0.0000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.910E-03	0.0001

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.0000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.329E+01	0.9936
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.0000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.159E-02	0.0031
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.0000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.989E-03	0.0003
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.0000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.147E-03	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.0000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.684E-02	0.0020
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.0000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.325E-03	0.0007
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.0000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.337E+01	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Radio- Nuclide	Ground			Inhalation			Radon			Plant			Meat			Milk			Soil		
	mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.	
Co-60	9.571E-01	0.9315		1.021E-05	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		3.563E-05	0.0000	
Cs-137	2.616E-02	0.0255		1.947E-07	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		8.668E-06	0.0000	
Pu-239	2.914E-06	0.0000		3.227E-03	0.0031		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		7.563E-04	0.0007	
U-234	1.628E-05	0.0000		3.873E-03	0.0038		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		2.359E-04	0.0002	
U-235	2.356E-02	0.0229		3.009E-03	0.0029		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		1.890E-04	0.0002	
U-238	5.621E-03	0.0055		3.429E-03	0.0033		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		2.221E-04	0.0002	
=====	=====	=====		=====	=====		=====	=====		=====	=====		=====	=====		=====	=====		=====	=====	
Total	1.012E+00	0.9854		1.355E-02	0.0132		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		1.448E-03	0.0014	
0																					

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Radio- Nuclide	Water			Fish			Radon			Plant			Meat			Milk			All Pathways*		
	mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.	
Co-60	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		9.571E-01	0.9316	
Cs-137	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		2.617E-02	0.0255	
Pu-239	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		3.986E-03	0.0039	
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		4.126E-03	0.0040	
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		2.675E-02	0.0260	
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		9.273E-03	0.0090	
=====	=====	=====		=====	=====		=====	=====		=====	=====		=====	=====		=====	=====		=====	=====	
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		1.027E+00	1.0000	
0*Sum of all water independent and dependent pathways.																					

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	9.601E-05	0.0020	1.026E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.579E-09	0.0000
Cs-137	5.167E-03	0.1055	3.847E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.713E-06	0.0000
Pu-239	2.908E-06	0.0001	3.219E-03	0.0657	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.545E-04	0.0154
U-234	2.329E-05	0.0005	3.804E-03	0.0777	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.316E-04	0.0047
U-235	2.318E-02	0.4734	3.193E-03	0.0652	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.083E-04	0.0043
U-238	5.509E-03	0.1125	3.364E-03	0.0687	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.178E-04	0.0044
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	3.398E-02	0.6939	1.358E-02	0.2773	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.414E-03	0.0289

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.602E-05	0.0020
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.169E-03	0.1055
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.976E-03	0.0812
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	4.059E-03	0.0829
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	2.659E-02	0.5428
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	9.091E-03	0.1856
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	4.898E-02	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	3.633E-16	0.0000	3.873E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.351E-20	0.0000
Cs-137	5.132E-05	0.0012	3.744E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.667E-08	0.0000
Pu-239	2.931E-06	0.0001	3.197E-03	0.0740	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.494E-04	0.0173
U-234	8.287E-05	0.0019	3.612E-03	0.0836	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.206E-04	0.0051
U-235	2.260E-02	0.5229	3.773E-03	0.0873	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.651E-04	0.0061
U-238	5.276E-03	0.1221	3.183E-03	0.0736	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.061E-04	0.0048
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	2.801E-02	0.6481	1.376E-02	0.3185	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.441E-03	0.0334

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.633E-16	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.134E-05	0.0012
Pu-239	0.000E+00	0.0000	0.000E+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-03	0.0914
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	3.915E-03	0.0906
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	2.664E-02	0.6163
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	8.664E-03	0.2005
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	4.322E-02	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground			Inhalation			Radon			Plant			Meat			Milk			Soil		
	mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.	
Co-60	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000	
Cs-137	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000	
Pu-239	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000	
U-234	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+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	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+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	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000	
=====	=====	=====		=====	=====		=====	=====		=====	=====		=====	=====		=====	=====		=====	=====	
Total	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000	
0																					

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water			Fish			Radon			Plant			Meat			Milk			All Pathways*		
	mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.		mrem/yr	fract.	
Co-60	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000	
Cs-137	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000	
Pu-239	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000	
U-234	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+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	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+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	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000	
=====	=====	=====		=====	=====		=====	=====		=====	=====		=====	=====		=====	=====		=====	=====	
Total	0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000		0.000E+00	0.0000	
0*Sum of all water independent and dependent pathways.																					

Dose/Source Ratios Summed Over All Pathways											
Parent and Progeny Principal Radionuclide Contributions Indicated		DSR(j, t) (mrem/yr)/(pCi/g)									
0Parent (i)	Product (j)	Branch Fraction*	t=	0.000E+00	1.000E+00	6.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
0Cs-137	Co-60	1.000E+00	5.173E-01	4.536E-01	2.350E-01	1.389E-01	1.000E-02	1.004E-06	3.797E-18	0.000E+00	0.000E+00
	Cs-137	1.000E+00	1.140E-01	1.114E-01	9.919E-02	9.041E-02	5.688E-02	1.124E-02	1.116E-04	0.000E+00	0.000E+00
	OPu-239	1.000E+00	1.425E-02	1.425E-02	1.425E-02	1.424E-02	1.420E-02	1.420E-02	1.411E-02	0.000E+00	0.000E+00
	Pu-239	1.000E+00	1.472E-11	4.415E-11	1.911E-10	3.086E-10	8.936E-10	2.912E-09	8.578E-09	0.000E+00	0.000E+00
	Pu-239	1.000E+00	1.707E-16	1.194E-15	2.165E-14	5.639E-14	4.738E-13	5.081E-12	4.395E-11	0.000E+00	0.000E+00
	Pu-239	1.000E+00	7.172E-18	1.068E-16	7.567E-15	3.080E-14	6.489E-13	1.511E-11	1.890E-10	0.000E+00	0.000E+00
	Pu-239	1.000E+00	1.425E-02	1.425E-02	1.425E-02	1.424E-02	1.420E-02	1.411E-02	1.411E-02	0.000E+00	0.000E+00
	U-234	1.000E+00	3.779E-03	3.778E-03	3.773E-03	3.769E-03	3.747E-03	3.674E-03	3.472E-03	0.000E+00	0.000E+00
	U-234	1.000E+00	4.153E-08	1.246E-07	5.394E-07	8.708E-07	2.522E-06	8.226E-06	2.390E-05	0.000E+00	0.000E+00
	U-234	Ra-226	1.000E+00	2.495E-10	1.746E-09	3.163E-08	8.234E-08	6.902E-07	7.337E-06	6.232E-05	0.000E+00
0U-234	U-234	1.000E+00	2.352E-14	3.504E-13	2.484E-11	1.012E-10	2.138E-09	4.998E-08	6.153E-07	0.000E+00	0.000E+00
	Po-210	1.000E+00	2.382E-15	5.807E-14	7.139E-12	3.175E-11	7.401E-10	1.794E-08	2.230E-07	0.000E+00	0.000E+00
	U-234	1.000E+00	3.779E-03	3.778E-03	3.773E-03	3.770E-03	3.751E-03	3.690E-03	3.559E-03	0.000E+00	0.000E+00
	U-235	1.000E+00	2.989E-02	2.988E-02	2.984E-02	2.980E-02	2.964E-02	2.906E-02	2.793E-02	0.000E+00	0.000E+00
	U-235	1.000E+00	5.198E-07	1.559E-06	6.748E-06	1.089E-05	3.147E-05	1.019E-04	2.907E-04	0.000E+00	0.000E+00
	U-235	1.000E+00	2.908E-08	2.017E-07	3.472E-06	8.678E-06	6.012E-05	3.775E-04	1.378E-03	0.000E+00	0.000E+00
	U-235	1.000E+00	2.989E-02	2.988E-02	2.985E-02	2.982E-02	2.973E-02	2.954E-02	2.959E-02	0.000E+00	0.000E+00
	U-238	1.000E+00	8.579E-03	8.576E-03	8.564E-03	8.555E-03	8.507E-03	8.339E-03	7.946E-03	0.000E+00	0.000E+00
	U-238	1.000E+00	5.357E-09	1.607E-08	6.952E-08	1.122E-07	3.240E-07	1.047E-06	2.959E-06	0.000E+00	0.000E+00
	U-238	Th-230	1.000E+00	3.924E-14	2.746E-13	4.978E-12	1.296E-11	1.089E-10	1.167E-09	1.004E-08	0.000E+00
0U-238	Ra-226	1.000E+00	1.768E-16	2.652E-15	1.951E-13	8.183E-13	1.990E-11	6.970E-10	1.770E-08	0.000E+00	0.000E+00
	Pb-210	1.000E+00	1.335E-20	4.115E-19	1.162E-16	7.664E-16	4.824E-14	3.982E-12	1.599E-10	0.000E+00	0.000E+00
	U-238	1.000E+00	1.169E-21	5.979E-20	3.123E-17	2.297E-16	1.640E-14	1.421E-12	5.783E-11	0.000E+00	0.000E+00
	U-238	1.000E+00	8.579E-03	8.576E-03	8.564E-03	8.555E-03	8.507E-03	8.340E-03	7.949E-03	0.000E+00	0.000E+00

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*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
\$ is used to indicate summation; the Greek sigma is not included in this font.
The DSR includes contributions from associated (half-life <= 30 days) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g									
Basic Radiation Dose Limit = 2.500E+01 mrem/yr									
0Nuclide	t=	0.000E+00	1.000E+00	6.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Co-60		4.832E+01	5.512E+01	1.064E+02	1.800E+02	2.499E+03	2.491E+07	*1.131E+15	*1.131E+15
Cs-137		2.193E+02	2.245E+02	2.521E+02	2.765E+02	4.395E+02	2.225E+03	2.240E+05	*8.701E+13
Pu-239		1.754E+03	1.754E+03	1.755E+03	1.755E+03	1.756E+03	1.760E+03	1.772E+03	*6.212E+10
U-234		6.615E+03	6.617E+03	6.625E+03	6.632E+03	6.666E+03	6.776E+03	7.024E+03	*6.245E+09
U-235		8.365E+02	8.367E+02	8.376E+02	8.383E+02	8.410E+02	8.463E+02	8.448E+02	*2.160E+06
U-238		2.914E+03	2.915E+03	2.919E+03	2.922E+03	2.939E+03	2.997E+03	3.145E+03	*3.360E+05
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*At specific activity limit

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Summed Dose/Source Ratios DSR(i,t) in (mrem/yr) / (pCi/g)									
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g									
at tmin = time of minimum single radionuclide soil guideline									
and at tmax = time of maximum total dose = 0.000E+00 years									
0Nuclide	Initial	tmin	DSR(i,tmin)	G(i,tmin)	DSR(i,tmax)	G(i,tmax)	DSR(i,tmin)	G(i,tmin)	DSR(i,tmax)
(i)	(pCi/g)	(years)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)
Co-60	9.567E+01	0.000E+00	5.173E-01	4.832E+01	5.173E-01	4.832E+01	5.173E-01	4.832E+01	5.173E-01
Cs-137	4.600E-01	0.000E+00	1.140E-01	2.193E+02	1.140E-01	2.193E+02	1.140E-01	2.193E+02	1.140E-01
Pu-239	2.800E-01	0.000E+00	1.425E-02	1.754E+03	1.425E-02	1.754E+03	1.425E-02	1.754E+03	1.425E-02
U-234	1.100E+00	0.000E+00	3.779E-03	6.615E+03	3.779E-03	6.615E+03	3.779E-03	6.615E+03	3.779E-03
U-235	9.000E-01	0.000E+00	2.989E-02	8.365E+02	2.989E-02	8.365E+02	2.989E-02	8.365E+02	2.989E-02
U-238	1.090E+00	0.000E+00	8.579E-03	2.914E+03	8.579E-03	2.914E+03	8.579E-03	2.914E+03	8.579E-03
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Individual Nuclide Dose Summed Over All Pathways									
Parent Nuclide and Branch Fraction Indicated		DOSE(j,t), mrem/yr							
ONuclide (j)	Parent (i)	BRF(i)	t=	0.000E+00	1.000E+00	6.000E+00	1.000E+01	3.000E+01	1.000E+02 3.000E+02 1.000E+03
Co-60	Co-60	1.000E+00	4.949E+01	4.339E+01	2.248E+01	1.329E+01	9.571E-01	9.602E-05	3.633E-16 0.000E+00
0Cs-137	Cs-137	1.000E+00	5.243E-02	5.123E-02	4.563E-02	4.159E-02	2.617E-02	5.169E-03	5.134E-05 0.000E+00
0Pu-239	Pu-239	1.000E+00	3.990E-03	3.990E-03	3.989E-03	3.989E-03	3.986E-03	3.976E-03	3.950E-03 0.000E+00
0U-235	Pu-239	1.000E+00	4.121E-12	1.236E-11	5.352E-11	8.640E-11	2.502E-10	8.154E-10	2.402E-09 0.000E+00
U-235	U-235	1.000E+00	2.690E-02	2.689E-02	2.685E-02	2.682E-02	2.667E-02	2.615E-02	2.513E-02 0.000E+00
U-235	\$DOSE(j)		2.690E-02	2.689E-02	2.685E-02	2.682E-02	2.667E-02	2.615E-02	2.513E-02 0.000E+00
0Pa-231	Pu-239	1.000E+00	4.778E-17	3.344E-16	6.062E-15	1.579E-14	1.327E-13	1.423E-12	1.231E-11 0.000E+00
Pa-231	U-235	1.000E+00	4.678E-07	1.403E-06	6.073E-06	9.800E-06	2.833E-05	9.173E-05	2.616E-04 0.000E+00
Pa-231	\$DOSE(j)		4.678E-07	1.403E-06	6.073E-06	9.800E-06	2.833E-05	9.173E-05	2.616E-04 0.000E+00
0Ac-227	Pu-239	1.000E+00	2.008E-18	2.991E-17	2.119E-15	8.623E-15	1.817E-13	4.230E-12	5.291E-11 0.000E+00
Ac-227	U-235	1.000E+00	2.617E-08	1.815E-07	3.124E-06	7.810E-06	5.411E-05	3.397E-04	1.241E-03 0.000E+00
Ac-227	\$DOSE(j)		2.617E-08	1.815E-07	3.124E-06	7.810E-06	5.411E-05	3.397E-04	1.241E-03 0.000E+00
0U-234	U-234	1.000E+00	4.157E-03	4.156E-03	4.150E-03	4.145E-03	4.122E-03	4.041E-03	3.819E-03 0.000E+00
U-234	U-238	1.000E+00	5.839E-09	1.751E-08	7.578E-08	1.223E-07	3.532E-07	1.141E-06	3.225E-06 0.000E+00
U-234	\$DOSE(j)		4.157E-03	4.156E-03	4.150E-03	4.145E-03	4.122E-03	4.041E-03	3.819E-03 0.000E+00
0Th-230	U-234	1.000E+00	4.568E-08	1.370E-07	5.933E-07	9.579E-07	2.774E-06	9.049E-06	2.629E-05 0.000E+00
Th-230	U-238	1.000E+00	4.277E-14	2.994E-13	5.426E-12	1.413E-11	1.187E-10	1.272E-09	1.095E-08 0.000E+00
Th-230	\$DOSE(j)		4.568E-08	1.370E-07	5.933E-07	9.579E-07	2.774E-06	9.049E-06	2.629E-05 0.000E+00
0Ra-226	U-234	1.000E+00	2.744E-10	1.921E-09	3.479E-08	9.058E-08	7.593E-07	8.071E-06	6.855E-05 0.000E+00
Ra-226	U-238	1.000E+00	1.927E-16	2.890E-15	2.126E-13	8.919E-13	2.169E-11	7.597E-10	1.930E-08 0.000E+00
Ra-226	\$DOSE(j)		2.744E-10	1.921E-09	3.479E-08	9.058E-08	7.593E-07	8.072E-06	6.857E-05 0.000E+00
0Pb-210	U-234	1.000E+00	2.587E-14	3.854E-13	2.732E-11	1.113E-10	2.352E-09	5.498E-08	6.768E-07 0.000E+00
Pb-210	U-238	1.000E+00	1.455E-20	4.486E-19	1.267E-16	8.354E-16	5.258E-14	4.340E-12	1.743E-10 0.000E+00
Pb-210	\$DOSE(j)		2.587E-14	3.854E-13	2.732E-11	1.113E-10	2.352E-09	5.498E-08	6.770E-07 0.000E+00
0Po-210	U-234	1.000E+00	2.620E-15	6.388E-14	7.853E-12	3.492E-11	8.141E-10	1.973E-08	2.453E-07 0.000E+00
Po-210	U-238	1.000E+00	1.274E-21	6.517E-20	3.405E-17	2.504E-16	1.788E-14	1.549E-12	6.304E-11 0.000E+00
Po-210	\$DOSE(j)		2.620E-15	6.388E-14	7.853E-12	3.492E-11	8.141E-10	1.974E-08	2.453E-07 0.000E+00
0U-238	U-238	1.000E+00	9.351E-03	9.348E-03	9.335E-03	9.325E-03	9.272E-03	9.090E-03	8.661E-03 0.000E+00
U-238	\$DOSE(j)		9.351E-03	9.348E-03	9.335E-03	9.325E-03	9.272E-03	9.090E-03	8.661E-03 0.000E+00

BRF(i) is the branch fraction of the parent nuclide.
\$ is used to indicate summation; the Greek sigma is not included in this font.

Individual Nuclide Soil Concentration											
		Parent Nuclide and Branch Fraction Indicated									
0Nuclide	Parent	BRF(i)	t=	0.000E+00	1.000E+00	6.000E+00	1.000E+00	3.000E+01	1.000E+02	3.000E+02	1.000E+03
(j)	(i)										
Co-60	Co-60	1.000E+00	9.567E+01	8.388E+01	4.346E+01	2.568E+01	1.851E+00	1.859E-04	7.020E-16	0.000E+00	
OCs-137	Cs-137	1.000E+00	4.600E-01	4.495E-01	4.003E-01	3.649E-01	2.296E-01	4.537E-02	4.415E-04	4.012E-11	
OPu-239	Pu-239	1.000E+00	2.800E-01	2.800E-01	2.799E-01	2.799E-01	2.797E-01	2.791E-01	2.772E-01	2.707E-01	
OU-235	Pu-239	1.000E+00	0.000E+00	2.757E-10	1.653E-09	2.753E-09	8.234E-09	2.715E-08	7.895E-08	2.364E-07	
U-235	U-235	1.000E+00	9.000E-01	8.997E-01	8.985E-01	8.975E-01	8.925E-01	8.752E-01	8.275E-01	6.804E-01	
U-235	SS(j):		9.000E-01	8.997E-01	8.985E-01	8.975E-01	8.925E-01	8.752E-01	8.275E-01	6.804E-01	
OPa-231	Pu-239	1.000E+00	0.000E+00	2.917E-15	1.049E-13	2.912E-13	2.612E-12	2.866E-11	2.490E-10	2.448E-09	
Pa-231	U-235	1.000E+00	0.000E+00	1.904E-05	1.141E-04	1.900E-04	5.670E-04	1.858E-03	5.302E-03	1.485E-02	
Pa-231	SS(j):		0.000E+00	1.904E-05	1.141E-04	1.900E-04	5.670E-04	1.858E-03	5.302E-03	1.485E-02	
OAc-227	Pu-239	1.000E+00	0.000E+00	3.071E-17	6.370E-15	2.857E-14	6.642E-13	1.600E-11	2.008E-10	2.278E-09	
Ac-227	U-235	1.000E+00	0.000E+00	2.998E-07	1.023E-05	2.725E-05	2.014E-04	1.292E-03	4.716E-03	1.428E-02	
Ac-227	SS(j):		0.000E+00	2.998E-07	1.023E-05	2.725E-05	2.014E-04	1.292E-03	4.716E-03	1.428E-02	
OU-234	U-234	1.000E+00	1.100E+00	1.100E+00	1.098E+00	1.097E+00	1.091E+00	1.069E+00	1.011E+00	8.292E-01	
U-234	U-238	1.000E+00	0.000E+00	3.089E-06	1.851E-05	3.081E-05	9.192E-05	3.004E-04	8.520E-04	2.333E-03	
U-234	SS(j):		1.100E+00	1.100E+00	1.098E+00	1.097E+00	1.091E+00	1.070E+00	1.011E+00	8.315E-01	
0Th-230	U-234	1.000E+00	0.000E+00	9.901E-06	5.936E-05	9.888E-05	2.958E-04	9.759E-04	2.844E-03	8.585E-03	
Th-230	U-238	1.000E+00	0.000E+00	1.391E-11	5.001E-10	1.388E-09	1.245E-08	1.365E-07	1.182E-06	1.152E-05	
Th-230	SS(j):		0.000E+00	9.901E-06	5.936E-05	9.888E-05	2.958E-04	9.760E-04	2.845E-03	8.596E-03	
ORa-226	U-234	1.000E+00	0.000E+00	2.144E-09	7.708E-08	2.139E-07	1.914E-06	2.084E-05	1.771E-04	1.618E-03	
Ra-226	U-238	1.000E+00	0.000E+00	2.008E-15	4.331E-13	2.003E-12	5.376E-11	1.952E-09	4.978E-08	1.515E-06	
Ra-226	SS(j):		0.000E+00	2.144E-09	7.708E-08	2.139E-07	1.914E-06	2.084E-05	1.772E-04	1.620E-03	
OPb-210	U-234	1.000E+00	0.000E+00	2.205E-11	4.578E-09	2.055E-08	4.791E-07	1.159E-05	1.439E-04	1.526E-03	
Pb-210	U-238	1.000E+00	0.000E+00	1.551E-17	1.947E-14	1.465E-13	1.053E-11	9.099E-10	3.699E-08	1.385E-06	
Pb-210	SS(j):		0.000E+00	2.205E-11	4.578E-09	2.055E-08	4.791E-07	1.159E-05	1.439E-04	1.527E-03	
OPo-210	U-234	1.000E+00	0.000E+00	7.289E-12	3.544E-09	1.758E-08	4.553E-07	1.143E-05	1.433E-04	1.523E-03	
Po-210	U-238	1.000E+00	0.000E+00	4.314E-18	1.402E-14	1.194E-13	9.824E-12	8.920E-10	3.676E-08	1.382E-06	
Po-210	SS(j):		0.000E+00	7.289E-12	3.544E-09	1.758E-08	4.553E-07	1.143E-05	1.433E-04	1.525E-03	
OU-238	U-238	1.000E+00	1.090E+00	1.090E+00	1.088E+00	1.087E+00	1.081E+00	1.060E+00	1.002E+00	8.240E-01	
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
BRF(i) is the branch fraction of the parent nuclide.											
\$ is used to indicate summation; the Greek sigma is not included in this font.											
ORESCALC.EXE execution time = 2.35 seconds											

Exhibit 2

RESRAD Scenario CAS 10-09-06 Hot Spot 100m²

(23 Pages)

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines
=====

Dose Conversion Factor (and Related) Parameter Summary ...	2
Site-Specific Parameter Summary	5
Summary of Pathway Selections	10
Contaminated Zone and Total Dose Summary	11
Total Dose Components	
Time = 0.000E+00	12
Time = 1.000E+00	13
Time = 3.000E+00	14
Time = 1.000E+01	15
Time = 3.000E+01	16
Time = 1.000E+02	17
Time = 3.000E+02	18
Time = 1.000E+03	19
Dose/Source Ratios Summed Over All Pathways	20
Single Radionuclide Soil Guidelines	20
Dose Per Nuclide Summed Over All Pathways	22
Soil Concentration Per Nuclide	23

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	Co-60	2.190E-04	2.190E-04	DCF2 (2)
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2 (3)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2 (4)
B-1	Pb-210+D	1.380E-02	1.380E-02	DCF2 (5)
B-1	Po-210	9.400E-03	9.400E-03	DCF2 (6)
B-1	Pu-239	4.290E-01	4.290E-01	DCF2 (7)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2 (8)
B-1	Th-230	3.260E-01	3.260E-01	DCF2 (9)
B-1	U-234	1.320E-01	1.320E-01	DCF2 (10)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2 (11)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2 (12)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3 (1)
D-1	Co-60	2.690E-05	2.690E-05	DCF3 (2)
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3 (3)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3 (4)
D-1	Pb-210+D	5.370E-03	5.370E-03	DCF3 (5)
D-1	Po-210	1.900E-03	1.900E-03	DCF3 (6)
D-1	Pu-239	3.540E-03	3.540E-03	DCF3 (7)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3 (8)
D-1	Th-230	5.480E-04	5.480E-04	DCF3 (9)
D-1	U-234	2.830E-04	2.830E-04	DCF3 (10)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3 (11)
D-1	U-238+D	2.690E-04	2.690E-04	DCF3 (12)
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	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF (2,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF (2,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF (2,3)
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF (3,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF (3,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF (3,3)
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF (4,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF (4,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF (4,3)
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF (5,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF (5,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF (5,3)

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

File: FGR 13 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
0				
D-34	Po-210 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(6,1)
D-34	Po-210 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(6,2)
D-34	Po-210 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.400E-04	3.400E-04	RTF(6,3)
D-34				
D-34	Pu-239 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(7,1)
D-34	Pu-239 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(7,2)
D-34	Pu-239 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(7,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(8,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(8,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(8,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(9,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(9,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(9,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(10,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(10,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(10,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(11,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(11,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(11,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(12,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(12,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(12,3)
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	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(2,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(2,2)
D-5				
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(3,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(4,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(4,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(5,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(5,2)
D-5				
D-5	Po-210 , fish	1.000E+02	1.000E+02	BIOFAC(6,1)
D-5	Po-210 , crustacea and mollusks	2.000E+04	2.000E+04	BIOFAC(6,2)
D-5				
D-5	Pu-239 , fish	3.000E+01	3.000E+01	BIOFAC(7,1)
D-5	Pu-239 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(7,2)
D-5				

Site-Specific Parameter Summary						
	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
0	Menu					
R011	Area of contaminated zone (m**2)	1.000E+02	1.000E+04	---		AREA
R011	Thickness of contaminated zone (m)	6.100E-01	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	2.500E+01	---		BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---		TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---		T (2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---		T (3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---		T (4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---		T (5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---		T (6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---		T (7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---		T (8)
R011	Times for calculations (yr)	not used	0.000E+00	---		T (9)
R011	Times for calculations (yr)	not used	0.000E+00	---		T (10)
R012	Initial principal radionuclide (pCi/g): Co-60	1.400E+02	0.000E+00	---		S1 (2)
R012	Initial principal radionuclide (pCi/g): Cs-137	4.600E-01	0.000E+00	---		S1 (3)
R012	Initial principal radionuclide (pCi/g): Pu-239	2.510E-01	0.000E+00	---		S1 (7)
R012	Initial principal radionuclide (pCi/g): U-234	1.090E+00	0.000E+00	---		S1 (10)
R012	Initial principal radionuclide (pCi/g): U-235	8.000E-02	0.000E+00	---		S1 (11)
R012	Initial principal radionuclide (pCi/g): U-238	1.100E+00	0.000E+00	---		S1 (12)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---		W1 (2)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---		W1 (3)
R012	Concentration in groundwater (pCi/L): Pu-239	not used	0.000E+00	---		W1 (7)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---		W1 (10)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---		W1 (11)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---		W1 (12)
R013	Cover depth (m)	0.000E+00	0.000E+00	---		COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---		DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---		VCV
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00	---		DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---		VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---		TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---		FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---		HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---		BCZ
R013	Average annual wind speed (m/sec)	3.500E+00	2.000E+00	---		WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---		HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---		EVAPTR
R013	Precipitation (m/yr)	3.000E-02	1.000E+00	---		PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---		RI
R013	Irrigation mode	overhead	overhead	---		IDITCH
R013	Runoff coefficient	4.000E-01	2.000E-01	---		RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	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

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
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
R015		Unsat. zone 1, thickness (m)	not used	4.000E+00		---	H(1)
R015		Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00		---	DENSUZ(1)
R015		Unsat. zone 1, total porosity	not used	4.000E-01		---	TPUZ(1)
R015		Unsat. zone 1, effective porosity	not used	2.000E-01		---	EPUZ(1)
R015		Unsat. zone 1, field capacity	not used	2.000E-01		---	FCUZ(1)
R015		Unsat. zone 1, soil-specific b parameter	not used	5.300E+00		---	BUZ(1)
R015		Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01		---	HCUZ(1)
R016		Distribution coefficients for Co-60					
R016		Contaminated zone (cm**3/g)	1.000E+03	1.000E+03		---	DCNUCC(2)
R016		Unsat. zone 1 (cm**3/g)	not used	1.000E+03		---	DCNUCU(2,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+03		---	DCNUCS(2)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.191E-04	ALEACH(2)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(2)
R016		Distribution coefficients for Cs-137					
R016		Contaminated zone (cm**3/g)	1.700E+02	1.000E+03		---	DCNUCC(3)
R016		Unsat. zone 1 (cm**3/g)	not used	1.000E+03		---	DCNUCU(3,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+03		---	DCNUCS(3)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		7.000E-04	ALEACH(3)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(3)
R016		Distribution coefficients for Pu-239					
R016		Contaminated zone (cm**3/g)	2.000E+03	2.000E+03		---	DCNUCC(7)
R016		Unsat. zone 1 (cm**3/g)	not used	2.000E+03		---	DCNUCU(7,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+03		---	DCNUCS(7)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		5.956E-05	ALEACH(7)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(7)
R016		Distribution coefficients for U-234					
R016		Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC(10)
R016		Unsat. zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU(10,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS(10)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		3.385E-03	ALEACH(10)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(10)
R016		Distribution coefficients for U-235					
R016		Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC(11)
R016		Unsat. zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU(11,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS(11)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		3.385E-03	ALEACH(11)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(11)

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
		Distribution coefficients for U-238					
R016		Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC (12)
R016		Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (12,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (12)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		3.385E-03	ALEACH (12)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (12)
		Distribution coefficients for daughter Ac-227					
R016		Contaminated zone (cm**3/g)	2.000E+01	2.000E+01		---	DCNUCC (1)
R016		Unsaturated zone 1 (cm**3/g)	not used	2.000E+01		---	DCNUCU (1,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+01		---	DCNUCS (1)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		5.900E-03	ALEACH (1)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (1)
		Distribution coefficients for daughter Pa-231					
R016		Contaminated zone (cm**3/g)	5.000E+01	5.000E+01		---	DCNUCC (4)
R016		Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (4,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (4)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		2.373E-03	ALEACH (4)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (4)
		Distribution coefficients for daughter Pb-210					
R016		Contaminated zone (cm**3/g)	1.000E+02	1.000E+02		---	DCNUCC (5)
R016		Unsaturated zone 1 (cm**3/g)	not used	1.000E+02		---	DCNUCU (5,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+02		---	DCNUCS (5)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.189E-03	ALEACH (5)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (5)
		Distribution coefficients for daughter Po-210					
R016		Contaminated zone (cm**3/g)	1.000E+01	1.000E+01		---	DCNUCC (6)
R016		Unsaturated zone 1 (cm**3/g)	not used	1.000E+01		---	DCNUCU (6,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+01		---	DCNUCS (6)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.169E-02	ALEACH (6)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (6)
		Distribution coefficients for daughter Ra-226					
R016		Contaminated zone (cm**3/g)	7.000E+01	7.000E+01		---	DCNUCC (8)
R016		Unsaturated zone 1 (cm**3/g)	not used	7.000E+01		---	DCNUCU (8,1)
R016		Saturated zone (cm**3/g)	not used	7.000E+01		---	DCNUCS (8)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.697E-03	ALEACH (8)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (8)
		Distribution coefficients for daughter Th-230					
R016		Contaminated zone (cm**3/g)	6.000E+04	6.000E+04		---	DCNUCC (9)
R016		Unsaturated zone 1 (cm**3/g)	not used	6.000E+04		---	DCNUCU (9,1)
R016		Saturated zone (cm**3/g)	not used	6.000E+04		---	DCNUCS (9)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.985E-06	ALEACH (9)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (9)
R017		Inhalation rate (m**3/yr)	1.230E+04	8.400E+03		---	INHALR
R017		Mass loading for inhalation (g/m**3)	6.000E-04	1.000E-04		---	MLINH

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
R017		Exposure duration	2.500E+01	3.000E+01		---	ED
R017		Shielding factor, inhalation	1.000E+00	4.000E-01		---	SHF3
R017		Shielding factor, external gamma	1.000E+00	7.000E-01		---	SHF1
R017		Fraction of time spent indoors	0.000E+00	5.000E-01		---	FIND
R017		Fraction of time spent outdoors (on site)	3.800E-02	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)	2.010E+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

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
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		---	RDY(1)
R19B		Dry Foliar Interception Fraction for Leafy	not used	2.500E-01		---	RDY(2)
R19B		Dry Foliar Interception Fraction for Fodder	not used	2.500E-01		---	RDY(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
C14		DCF correction factor for gaseous forms of C14	not used	8.894E+01		---	CO2F
STOR		Storage times of contaminated foodstuffs (days) :					
STOR		Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01		---	STOR_T(1)
STOR		Leafy vegetables	1.000E+00	1.000E+00		---	STOR_T(2)
STOR		Milk	1.000E+00	1.000E+00		---	STOR_T(3)
STOR		Meat and poultry	2.000E+01	2.000E+01		---	STOR_T(4)
STOR		Fish	7.000E+00	7.000E+00		---	STOR_T(5)
STOR		Crustacea and mollusks	7.000E+00	7.000E+00		---	STOR_T(6)
STOR		Well water	1.000E+00	1.000E+00		---	STOR_T(7)
STOR		Surface water	1.000E+00	1.000E+00		---	STOR_T(8)
STOR		Livestock fodder	4.500E+01	4.500E+01		---	STOR_T(9)

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
R021		Thickness of building foundation (m)	not used	1.500E-01		---	FLOOR1
R021		Bulk density of building foundation (g/cm**3)	not used	2.400E+00		---	DENSFL
R021		Total porosity of the cover material	not used	4.000E-01		---	TPCV
R021		Total porosity of the building foundation	not used	1.000E-01		---	TPFL
R021		Volumetric water content of the cover material	not used	5.000E-02		---	PH2OCV
R021		Volumetric water content of the foundation	not used	3.000E-02		---	PH2OFL
R021		Diffusion coefficient for radon gas (m/sec) :					
R021		in cover material	not used	2.000E-06		---	DIFCV
R021		in foundation material	not used	3.000E-07		---	DIFFL
R021		in contaminated zone soil	not used	2.000E-06		---	DIFCZ
R021		Radon vertical dimension of mixing (m)	not used	2.000E+00		---	HMIX
R021		Average building air exchange rate (1/hr)	not used	5.000E-01		---	REXG
R021		Height of the building (room) (m)	not used	2.500E+00		---	HRM
R021		Building interior area factor	not used	0.000E+00		---	FAI
R021		Building depth below ground surface (m)	not used	-1.000E+00		---	DMFL
R021		Emanating power of Rn-222 gas	not used	2.500E-01		---	EMANA(1)
R021		Emanating power of Rn-220 gas	not used	1.500E-01		---	EMANA(2)
TITL		Number of graphical time points	32	---		---	NPTS
TITL		Maximum number of integration points for dose	17	---		---	LYMAX
TITL		Maximum number of integration points for risk	1	---		---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	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	active
=====	=====

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	100.00 square meters	Co-60	1.400E+02
Thickness:	0.61 meters	Cs-137	4.600E-01
Cover Depth:	0.00 meters	Pu-239	2.510E-01
		U-234	1.090E+00
		U-235	8.000E-02
		U-238	1.100E+00

0

Total Dose TDose(t), mrem/yr	
Basic Radiation Dose Limit = 2.500E+01 mrem/yr	
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)	
t (years):	0.000E+00 1.000E+00 3.000E+00 1.000E+01 3.000E+01 1.000E+02 3.000E+02 1.000E+03
TDose(t):	6.365E+01 5.580E+01 4.290E+01 1.710E+01 1.262E+00 1.585E-02 6.997E-03 0.000E+00
M(t):	2.546E+00 2.232E+00 1.716E+00 6.840E-01 5.049E-02 6.341E-04 2.799E-04 0.000E+00
Maximum TDose(t): 6.365E+01 mrem/yr at t = 0.000E+00 years	

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

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	6.359E+01	0.9990	5.922E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.695E-04	0.0000
Cs-137	4.629E-02	0.0007	2.989E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.736E-06	0.0000
Pu-239	2.381E-06	0.0000	2.219E-03	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.786E-05	0.0000
U-234	1.407E-05	0.0000	2.961E-03	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.352E-05	0.0000
U-235	1.896E-03	0.0000	2.025E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.629E-06	0.0000
U-238	5.045E-03	0.0001	2.671E-03	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.256E-05	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	6.364E+01	0.9999	8.646E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.868E-04	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- Nuclide	Water		Fish		Radon		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.359E+01	0.9990
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.629E-02	0.0007
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.290E-03	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.998E-03	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	2.100E-03	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.739E-03	0.0001
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	6.365E+01	1.0000

0*Sum of all water independent and dependent pathways.

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

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	5.574E+01	0.9989	5.191E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.363E-04	0.0000
Cs-137	4.520E-02	0.0008	2.919E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.695E-06	0.0000
Pu-239	2.381E-06	0.0000	2.219E-03	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.786E-05	0.0000
U-234	1.403E-05	0.0000	2.951E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.344E-05	0.0000
U-235	1.889E-03	0.0000	2.019E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.625E-06	0.0000
U-238	5.028E-03	0.0001	2.662E-03	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.249E-05	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	5.580E+01	0.9998	8.554E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.534E-04	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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.574E+01	0.9989
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.520E-02	0.0008
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.290E-03	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.988E-03	0.0001
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	2.093E-03	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.713E-03	0.0001
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	5.580E+01	1.0000

0*Sum of all water independent and dependent pathways.

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

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	4.284E+01	0.9986	3.990E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.816E-04	0.0000
Cs-137	4.310E-02	0.0010	2.783E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.616E-06	0.0000
Pu-239	2.380E-06	0.0000	2.219E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.785E-05	0.0000
U-234	1.394E-05	0.0000	2.931E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.328E-05	0.0000
U-235	1.877E-03	0.0000	2.006E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.617E-06	0.0000
U-238	4.994E-03	0.0001	2.644E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.233E-05	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	4.289E+01	0.9998	8.394E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.983E-04	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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.284E+01	0.9986
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.310E-02	0.0010
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.289E-03	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.968E-03	0.0001
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	2.079E-03	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.661E-03	0.0002
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	4.290E+01	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	1.705E+01	0.9970	1.588E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.227E-05	0.0000
Cs-137	3.648E-02	0.0021	2.356E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.368E-06	0.0000
Pu-239	2.379E-06	0.0000	2.218E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.780E-05	0.0000
U-234	1.369E-05	0.0000	2.863E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.274E-05	0.0000
U-235	1.833E-03	0.0001	1.966E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.591E-06	0.0000
U-238	4.877E-03	0.0003	2.582E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.181E-05	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	1.709E+01	0.9995	8.018E-03	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.876E-04	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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.705E+01	0.9970
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.649E-02	0.0021
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.288E-03	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.899E-03	0.0002
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	2.031E-03	0.0001
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	7.481E-03	0.0004
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	1.710E+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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	1.226E+00	0.9710	1.142E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.197E-06	0.0000
Cs-137	2.266E-02	0.0180	1.463E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.500E-07	0.0000
Pu-239	2.375E-06	0.0000	2.214E-03	0.0018	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.768E-05	0.0001
U-234	1.335E-05	0.0000	2.677E-03	0.0021	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.126E-05	0.0000
U-235	1.714E-03	0.0014	1.865E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.528E-06	0.0000
U-238	4.558E-03	0.0036	2.413E-03	0.0019	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.039E-05	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	1.255E+00	0.9940	7.502E-03	0.0059	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.169E-04	0.0001

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.226E+00	0.9710
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.266E-02	0.0180
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.284E-03	0.0018
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.711E-03	0.0021
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	1.902E-03	0.0015
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	6.991E-03	0.0055
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	1.262E+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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	1.220E-04	0.0077	1.138E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.180E-10	0.0000
Cs-137	4.280E-03	0.2700	2.765E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.606E-07	0.0000
Pu-239	2.361E-06	0.0001	2.200E-03	0.1388	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.727E-05	0.0042
U-234	1.607E-05	0.0010	2.116E-03	0.1334	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.680E-05	0.0011
U-235	1.357E-03	0.0856	1.593E-04	0.0101	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.359E-06	0.0001
U-238	3.594E-03	0.2267	1.905E-03	0.1201	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.609E-05	0.0010
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	9.372E-03	0.5912	6.380E-03	0.4024	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.017E-04	0.0064

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.220E-04	0.0077
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.280E-03	0.2700
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.270E-03	0.1432
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.148E-03	0.1355
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	1.518E-03	0.0957
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.515E-03	0.3479
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	1.585E-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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	4.413E-16	0.0000	4.205E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.914E-21	0.0000
Cs-137	3.651E-05	0.0052	2.366E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.374E-09	0.0000
Pu-239	2.316E-06	0.0003	2.161E-03	0.3089	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.609E-05	0.0094
U-234	4.248E-05	0.0061	1.084E-03	0.1549	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.652E-06	0.0012
U-235	6.978E-04	0.0997	1.035E-04	0.0148	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.634E-07	0.0001
U-238	1.816E-03	0.2596	9.684E-04	0.1384	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.180E-06	0.0012
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	2.595E-03	0.3709	4.317E-03	0.6171	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.389E-05	0.0120

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.413E-16	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.651E-05	0.0052
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.230E-03	0.3187
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	1.135E-03	0.1622
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	8.023E-04	0.1147
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	2.793E-03	0.3992
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	6.997E-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+03 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
*Sum of all water independent and dependent pathways.														

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

0Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g)									
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03		
Co-60	Co-60	1.000E+00	4.542E-01	3.982E-01	3.060E-01	1.218E-01	8.755E-03	8.716E-07	3.152E-18	0.000E+00		
0Cs-137	Cs-137	1.000E+00	1.006E-01	9.827E-02	9.370E-02	7.932E-02	4.927E-02	9.305E-03	7.938E-05	0.000E+00		
0Pu-239	Pu-239	1.000E+00	9.122E-03	9.122E-03	9.120E-03	9.114E-03	9.098E-03	9.042E-03	8.884E-03	0.000E+00		
Pu-239	U-235	1.000E+00	1.293E-11	3.873E-11	9.007E-11	2.670E-10	7.493E-10	2.195E-09	4.802E-09	0.000E+00		
Pu-239	Pa-231	1.000E+00	1.149E-16	8.032E-16	4.229E-15	3.732E-14	3.027E-13	2.872E-12	1.770E-11	0.000E+00		
Pu-239	Ac-227	1.000E+00	5.519E-18	8.202E-17	9.373E-16	2.310E-14	4.628E-13	9.222E-12	7.944E-11	0.000E+00		
Pu-239	SDSR(j)		9.122E-03	9.122E-03	9.120E-03	9.114E-03	9.098E-03	9.042E-03	8.884E-03	0.000E+00		
0U-234	U-234	1.000E+00	2.751E-03	2.742E-03	2.723E-03	2.659E-03	2.485E-03	1.960E-03	9.955E-04	0.000E+00		
U-234	Th-230	1.000E+00	3.057E-08	9.158E-08	2.130E-07	6.314E-07	1.773E-06	5.211E-06	1.152E-05	0.000E+00		
U-234	Ra-226	1.000E+00	2.186E-10	1.528E-09	8.048E-09	7.107E-08	5.777E-07	5.520E-06	3.424E-05	0.000E+00		
U-234	Pb-210	1.000E+00	4.442E-15	6.610E-14	7.574E-13	1.884E-11	3.868E-10	8.159E-09	7.515E-08	0.000E+00		
U-234	Po-210	1.000E+00	4.742E-16	1.154E-14	1.915E-13	6.214E-12	1.406E-10	3.076E-09	2.860E-08	0.000E+00		
U-234	SDSR(j)		2.751E-03	2.742E-03	2.723E-03	2.660E-03	2.487E-03	1.971E-03	1.041E-03	0.000E+00		
0U-235	U-235	1.000E+00	2.625E-02	2.616E-02	2.598E-02	2.537E-02	2.371E-02	1.871E-02	9.494E-03	0.000E+00		
U-235	Pa-231	1.000E+00	3.499E-07	1.047E-06	2.429E-06	7.142E-06	1.958E-05	5.273E-05	8.871E-05	0.000E+00		
U-235	Ac-227	1.000E+00	2.237E-08	1.546E-07	7.949E-07	6.449E-06	4.177E-05	2.116E-04	4.459E-04	0.000E+00		
U-235	SDSR(j)		2.625E-02	2.616E-02	2.598E-02	2.539E-02	2.377E-02	1.897E-02	1.003E-02	0.000E+00		
0U-238	U-238	1.000E+00	7.035E-03	7.012E-03	6.964E-03	6.801E-03	6.356E-03	5.013E-03	2.538E-03	0.000E+00		
U-238	U-234	1.000E+00	3.897E-09	1.166E-08	2.702E-08	7.915E-08	2.149E-07	5.586E-07	4.485E-07	0.000E+00		
U-238	Th-230	1.000E+00	2.887E-14	2.017E-13	1.062E-12	9.349E-12	7.537E-11	7.005E-10	4.091E-09	0.000E+00		
U-238	Ra-226	1.000E+00	1.549E-16	2.319E-15	2.694E-14	7.034E-13	1.646E-11	5.040E-10	8.621E-09	0.000E+00		
U-238	Pb-210	1.000E+00	2.521E-21	7.759E-20	1.924E-18	1.422E-16	8.637E-15	6.277E-13	1.746E-11	0.000E+00		
U-238	Po-210	1.000E+00	2.327E-22	1.188E-20	4.406E-19	4.482E-17	3.086E-15	2.353E-13	6.635E-12	0.000E+00		
U-238	SDSR(j)		7.035E-03	7.012E-03	6.964E-03	6.801E-03	6.356E-03	5.014E-03	2.539E-03	0.000E+00		

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

\$ is used to indicate summations; the Greek sigma is not included in this font.
The DSR includes contributions from associated (half-life <= 30 days) daughters.

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

0Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Co-60	5.504E+01	6.279E+01	8.170E+01	2.053E+02	2.856E+03	2.868E+07	*1.131E+15	*1.131E+15
Cs-137	2.484E+02	2.544E+02	2.668E+02	3.152E+02	5.074E+02	2.687E+03	3.149E+05	*8.701E+13
Pu-239	2.740E+03	2.741E+03	2.741E+03	2.743E+03	2.748E+03	2.765E+03	2.814E+03	*6.212E+10
U-234	9.088E+03	9.119E+03	9.180E+03	9.399E+03	1.005E+04	1.268E+04	2.401E+04	*6.245E+09
U-235	9.525E+02	9.557E+02	9.621E+02	9.848E+02	1.052E+03	1.318E+03	2.493E+03	*2.160E+06
U-238	3.554E+03	3.566E+03	3.590E+03	3.676E+03	3.933E+03	4.986E+03	9.847E+03	*3.360E+05
=====								
*At specific activity limit	=====							

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

ONuclide	Initial	tmin	DSR(i,tmin)	G(i,tmin)	DSR(i,tmax)	G(i,tmax)
(i)	(pCi/g)	(years)		(pCi/g)		(pCi/g)
Co-60	1.400E+02	0.000E+00	4.542E-01	5.504E+01	4.542E-01	5.504E+01
Cs-137	4.600E-01	0.000E+00	1.006E-01	2.484E+02	1.006E-01	2.484E+02
Pu-239	2.510E-01	0.000E+00	9.122E-03	2.740E+03	9.122E-03	2.740E+03
U-234	1.090E+00	0.000E+00	2.751E-03	9.088E+03	2.751E-03	9.088E+03
U-235	8.000E-02	0.000E+00	2.625E-02	9.525E+02	2.625E-02	9.525E+02
U-238	1.100E+00	0.000E+00	7.035E-03	3.554E+03	7.035E-03	3.554E+03
=====	=====	=====	=====	=====	=====	=====

Individual Nuclide Dose Summed Over All Pathways

Parent Nuclide and Branch Fraction Indicated		DOSE(j,t), mrem/yr			
0Nuclide (j)	Parent (i)	BRF(i)	t= 0.000E+00 1.000E+00 3.000E+00 1.000E+01 1.000E+02 3.000E+02 1.000E+03		
Co-60	Co-60	1.000E+00	6.359E+01 5.574E+01 4.284E+01 1.705E+01 1.226E+00 1.220E-04 4.413E-16 0.000E+00		
Os-137	Cs-137	1.000E+00	4.629E-02 4.520E-02 4.310E-02 3.649E-02 2.266E-02 4.280E-03 3.651E-05 0.000E+00		
Pu-239	Pu-239	1.000E+00	2.290E-03 2.290E-03 2.289E-03 2.288E-03 2.284E-03 2.270E-03 2.230E-03 0.000E+00		
U-235	Pu-239	1.000E+00	3.246E-12 9.722E-12 2.261E-11 6.701E-11 1.881E-10 5.511E-10 1.205E-09 0.000E+00		
U-235	U-235	1.000E+00	2.100E-03 2.093E-03 2.079E-03 2.030E-03 1.897E-03 1.497E-03 7.595E-04 0.000E+00		
U-235	\$DOSE(j)		2.100E-03 2.093E-03 2.079E-03 2.030E-03 1.897E-03 1.497E-03 7.595E-04 0.000E+00		
Pa-231	Pu-239	1.000E+00	2.885E-17 2.016E-16 1.062E-15 9.368E-15 7.598E-14 7.209E-13 4.443E-12 0.000E+00		
Pa-231	U-235	1.000E+00	2.799E-08 8.377E-08 1.943E-07 5.714E-07 1.567E-06 4.218E-06 7.097E-06 0.000E+00		
Pa-231	\$DOSE(j)		2.799E-08 8.377E-08 1.943E-07 5.714E-07 1.567E-06 4.218E-06 7.097E-06 0.000E+00		
Ac-227	Pu-239	1.000E+00	1.385E-18 2.059E-17 2.353E-16 5.797E-15 1.162E-13 2.315E-12 1.994E-11 0.000E+00		
Ac-227	U-235	1.000E+00	1.789E-09 1.237E-08 6.359E-08 5.159E-07 3.341E-06 1.693E-05 3.567E-05 0.000E+00		
Ac-227	\$DOSE(j)		1.789E-09 1.237E-08 6.359E-08 5.159E-07 3.341E-06 1.693E-05 3.567E-05 0.000E+00		
U-234	U-234	1.000E+00	2.998E-03 2.988E-03 2.968E-03 2.899E-03 2.709E-03 2.137E-03 1.085E-03 0.000E+00		
U-234	U-238	1.000E+00	4.287E-09 1.282E-08 2.972E-08 8.707E-08 2.364E-07 6.145E-07 9.333E-07 0.000E+00		
U-234	\$DOSE(j)		2.998E-03 2.988E-03 2.968E-03 2.899E-03 2.709E-03 2.137E-03 1.085E-03 0.000E+00		
Th-230	U-234	1.000E+00	3.332E-08 9.982E-08 2.321E-07 6.882E-07 1.933E-06 5.680E-06 1.255E-05 0.000E+00		
Th-230	U-238	1.000E+00	3.176E-14 2.219E-13 1.168E-12 1.028E-11 8.290E-11 7.705E-10 4.500E-09 0.000E+00		
Th-230	\$DOSE(j)		3.332E-08 9.982E-08 2.321E-07 6.882E-07 1.933E-06 5.681E-06 1.256E-05 0.000E+00		
Ra-226	U-234	1.000E+00	2.383E-10 1.666E-09 8.772E-09 7.747E-08 6.296E-07 6.016E-06 3.732E-05 0.000E+00		
Ra-226	U-238	1.000E+00	1.704E-16 2.551E-15 2.963E-14 7.738E-13 1.810E-11 5.544E-10 9.483E-09 0.000E+00		
Ra-226	\$DOSE(j)		2.383E-10 1.666E-09 8.772E-09 7.747E-08 6.297E-07 6.017E-06 3.733E-05 0.000E+00		
Pb-210	U-234	1.000E+00	4.842E-15 7.205E-14 8.256E-13 2.054E-11 4.216E-10 8.893E-09 8.191E-08 0.000E+00		
Pb-210	U-238	1.000E+00	2.773E-21 8.534E-20 2.117E-18 1.565E-16 9.501E-15 6.904E-13 1.921E-11 0.000E+00		
Pb-210	\$DOSE(j)		4.842E-15 7.205E-14 8.256E-13 2.054E-11 4.216E-10 8.894E-09 8.193E-08 0.000E+00		
Po-210	U-234	1.000E+00	5.168E-16 1.258E-14 2.088E-13 6.773E-12 1.533E-10 3.353E-09 3.117E-08 0.000E+00		
Po-210	U-238	1.000E+00	2.559E-22 1.306E-20 4.846E-19 4.930E-17 3.395E-15 2.588E-13 7.299E-12 0.000E+00		
Po-210	\$DOSE(j)		5.168E-16 1.258E-14 2.088E-13 6.773E-12 1.533E-10 3.353E-09 3.118E-08 0.000E+00		
U-238	U-238	1.000E+00	7.739E-03 7.713E-03 7.661E-03 7.481E-03 6.991E-03 5.514E-03 2.792E-03 0.000E+00		

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

S is used to indicate summation; the Greek sigma is not included in this font.

Individual Nuclide Soil Concentration

Parent Nuclide and Branch Fraction Indicated		S (j,t), pCi/g									
0Nuclide Parent (i)	BRF(i)	t= 0.000E+00 1.000E+00 3.000E+00 1.000E+01 2.699E+00 2.691E-04 9.941E-16 0.000E+00									
Co-60	1.000E+00	1.400E+02	1.227E+02	9.433E+01	3.754E+01	2.699E+00	2.691E-04	9.941E-16	0.000E+00		
Co-60	1.000E+00	4.600E-01	4.492E-01	4.283E-01	3.626E-01	2.252E-01	4.255E-02	3.641E-04	2.111E-11		
0Pu-239	1.000E+00	2.510E-01	2.510E-01	2.509E-01	2.508E-01	2.503E-01	2.488E-01	2.444E-01	2.298E-01		
0U-235	1.000E+00	0.000E+00	2.468E-10	7.378E-10	2.430E-09	7.042E-09	2.087E-08	4.586E-08	6.610E-08		
U-235	1.000E+00	8.000E-02	7.973E-02	7.919E-02	7.734E-02	7.227E-02	5.703E-02	2.898E-02	2.710E-03		
SS(j) :		8.000E-02	7.973E-02	7.919E-02	7.734E-02	7.227E-02	5.703E-02	2.898E-02	2.710E-03		
0Pa-239	1.000E+00	0.000E+00	2.610E-15	2.340E-14	2.565E-13	2.220E-12	2.156E-11	1.338E-10	4.752E-10		
Pa-231	1.000E+00	0.000E+00	1.688E-06	5.034E-06	1.644E-05	4.656E-05	1.268E-04	2.142E-04	9.798E-05		
Pa-231	SS(j) :	0.000E+00	1.688E-06	5.034E-06	1.644E-05	4.656E-05	1.268E-04	2.142E-04	9.798E-05		
0Ac-227	1.000E+00	0.000E+00	2.745E-17	7.253E-16	2.494E-14	5.515E-13	1.137E-11	9.862E-11	3.947E-10		
Ac-227	1.000E+00	0.000E+00	2.656E-08	2.322E-07	2.338E-06	1.615E-05	8.363E-05	1.769E-04	8.676E-05		
Ac-227	SS(j) :	0.000E+00	2.656E-08	2.322E-07	2.338E-06	1.615E-05	8.363E-05	1.769E-04	8.676E-05		
0U-234	1.000E+00	1.090E+00	1.086E+00	1.079E+00	1.054E+00	9.847E-01	7.768E-01	3.945E-01	3.682E-02		
U-234	1.000E+00	0.000E+00	3.108E-06	9.261E-06	3.015E-05	8.452E-05	2.223E-04	3.387E-04	1.055E-04		
U-234	SS(j) :	1.090E+00	1.086E+00	1.079E+00	1.054E+00	9.847E-01	7.770E-01	3.948E-01	3.692E-02		
0Th-230	1.000E+00	0.000E+00	9.795E-06	2.929E-05	9.647E-05	2.799E-04	8.318E-04	1.845E-03	2.776E-03		
Th-230	1.000E+00	0.000E+00	1.400E-11	1.255E-10	1.372E-09	1.181E-08	1.123E-07	6.603E-07	2.072E-06		
Th-230	SS(j) :	0.000E+00	9.795E-06	2.929E-05	9.647E-05	2.799E-04	8.318E-04	1.845E-03	2.778E-03		
0Ra-226	1.000E+00	0.000E+00	2.121E-09	1.902E-08	2.087E-07	1.810E-06	1.772E-05	1.125E-04	4.318E-04		
Ra-226	1.000E+00	0.000E+00	2.022E-15	5.436E-14	1.982E-12	5.120E-11	1.625E-09	2.854E-08	2.691E-07		
Ra-226	SS(j) :	0.000E+00	2.121E-09	1.902E-08	2.087E-07	1.810E-06	1.772E-05	1.125E-04	4.321E-04		
0Pb-210	1.000E+00	0.000E+00	2.181E-11	5.780E-10	2.007E-08	4.545E-07	9.920E-06	9.218E-05	4.070E-04		
Pb-210	1.000E+00	0.000E+00	1.562E-17	1.245E-15	1.452E-13	1.007E-11	7.661E-10	2.158E-08	2.492E-07		
Pb-210	SS(j) :	0.000E+00	2.181E-11	5.780E-10	2.007E-08	4.546E-07	9.921E-06	9.220E-05	4.072E-04		
0Po-210	1.000E+00	0.000E+00	7.202E-12	3.561E-10	1.710E-08	4.299E-07	9.733E-06	9.131E-05	4.043E-04		
Po-210	1.000E+00	0.000E+00	4.340E-18	6.849E-16	1.179E-13	9.354E-12	7.475E-10	2.135E-08	2.475E-07		
Po-210	SS(j) :	0.000E+00	7.202E-12	3.561E-10	1.710E-08	4.299E-07	9.734E-06	9.133E-05	4.045E-04		
0U-238	1.000E+00	1.100E+00	1.096E+00	1.089E+00	1.063E+00	9.938E-01	7.841E-01	3.984E-01	3.726E-02		
U-238	1.000E+00	1.100E+00	1.096E+00	1.089E+00	1.063E+00	9.938E-01	7.841E-01	3.984E-01	3.726E-02		

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

S is used to indicate summation; the Greek sigma is not included in this font.

0RESCALC.EXE execution time = 2.46 seconds

Exhibit 3

RESRAD Scenario CAS 10-09-06 Hot Spot 10m²

(23 Pages)

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines
=====

Dose Conversion Factor (and Related) Parameter Summary ...	2
Site-Specific Parameter Summary	5
Summary of Pathway Selections	10
Contaminated Zone and Total Dose Summary	11
Total Dose Components	
Time = 0.000E+00	12
Time = 1.000E+00	13
Time = 3.000E+00	14
Time = 1.000E+01	15
Time = 3.000E+01	16
Time = 1.000E+02	17
Time = 3.000E+02	18
Time = 1.000E+03	19
Dose/Source Ratios Summed Over All Pathways	20
Single Radionuclide Soil Guidelines	20
Dose Per Nuclide Summed Over All Pathways	22
Soil Concentration Per Nuclide	23

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	Co-60	2.190E-04	2.190E-04	DCF2 (2)
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2 (3)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2 (4)
B-1	Pb-210+D	1.380E-02	1.380E-02	DCF2 (5)
B-1	Po-210	9.400E-03	9.400E-03	DCF2 (6)
B-1	Pu-239	4.290E-01	4.290E-01	DCF2 (7)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2 (8)
B-1	Th-230	3.260E-01	3.260E-01	DCF2 (9)
B-1	U-234	1.320E-01	1.320E-01	DCF2 (10)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2 (11)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2 (12)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3 (1)
D-1	Co-60	2.690E-05	2.690E-05	DCF3 (2)
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3 (3)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3 (4)
D-1	Pb-210+D	5.370E-03	5.370E-03	DCF3 (5)
D-1	Po-210	1.900E-03	1.900E-03	DCF3 (6)
D-1	Pu-239	3.540E-03	3.540E-03	DCF3 (7)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3 (8)
D-1	Th-230	5.480E-04	5.480E-04	DCF3 (9)
D-1	U-234	2.830E-04	2.830E-04	DCF3 (10)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3 (11)
D-1	U-238+D	2.690E-04	2.690E-04	DCF3 (12)
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	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF (2,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF (2,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF (2,3)
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF (3,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF (3,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF (3,3)
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF (4,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF (4,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF (4,3)
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF (5,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF (5,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF (5,3)

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

File: FGR 13 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
0				
D-34	Po-210 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(6,1)
D-34	Po-210 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(6,2)
D-34	Po-210 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.400E-04	3.400E-04	RTF(6,3)
D-34				
D-34	Pu-239 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(7,1)
D-34	Pu-239 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(7,2)
D-34	Pu-239 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(7,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(8,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(8,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(8,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(9,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(9,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(9,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(10,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(10,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(10,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(11,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(11,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(11,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(12,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(12,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(12,3)
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	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(2,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(2,2)
D-5				
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(3,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(4,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(4,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(5,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(5,2)
D-5				
D-5	Po-210 , fish	1.000E+02	1.000E+02	BIOFAC(6,1)
D-5	Po-210 , crustacea and mollusks	2.000E+04	2.000E+04	BIOFAC(6,2)
D-5				
D-5	Pu-239 , fish	3.000E+01	3.000E+01	BIOFAC(7,1)
D-5	Pu-239 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(7,2)
D-5				

Site-Specific Parameter Summary						
	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
0						
Menu						
R011	Area of contaminated zone (m**2)	1.000E+01	1.000E+04		---	AREA
R011	Thickness of contaminated zone (m)	6.100E-01	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	2.500E+01		---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00		---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00		---	T (2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00		---	T (3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01		---	T (4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01		---	T (5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02		---	T (6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02		---	T (7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03		---	T (8)
R011	Times for calculations (yr)	not used	0.000E+00		---	T (9)
R011	Times for calculations (yr)	not used	0.000E+00		---	T(10)
R012	Initial principal radionuclide (pCi/g): Co-60	1.400E+02	0.000E+00		---	S1 (2)
R012	Initial principal radionuclide (pCi/g): Cs-137	4.600E-01	0.000E+00		---	S1 (3)
R012	Initial principal radionuclide (pCi/g): Pu-239	2.510E-01	0.000E+00		---	S1 (7)
R012	Initial principal radionuclide (pCi/g): U-234	1.090E+00	0.000E+00		---	S1(10)
R012	Initial principal radionuclide (pCi/g): U-235	8.000E-02	0.000E+00		---	S1(11)
R012	Initial principal radionuclide (pCi/g): U-238	1.100E+00	0.000E+00		---	S1(12)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00		---	W1 (2)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00		---	W1 (3)
R012	Concentration in groundwater (pCi/L): Pu-239	not used	0.000E+00		---	W1 (7)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00		---	W1(10)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00		---	W1(11)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00		---	W1(12)
R013	Cover depth (m)	0.000E+00	0.000E+00		---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00		---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03		---	VCV
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00		---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03		---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01		---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01		---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01		---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00		---	BCZ
R013	Average annual wind speed (m/sec)	3.500E+00	2.000E+00		---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00		---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01		---	EVAPTR
R013	Precipitation (m/yr)	3.000E-02	1.000E+00		---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01		---	RI
R013	Irrigation mode	overhead	overhead		---	IDITCH
R013	Runoff coefficient	4.000E-01	2.000E-01		---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	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

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
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
R015		Unsat. zone 1, thickness (m)	not used	4.000E+00		---	H(1)
R015		Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00		---	DENSUZ(1)
R015		Unsat. zone 1, total porosity	not used	4.000E-01		---	TPUZ(1)
R015		Unsat. zone 1, effective porosity	not used	2.000E-01		---	EPUZ(1)
R015		Unsat. zone 1, field capacity	not used	2.000E-01		---	FCUZ(1)
R015		Unsat. zone 1, soil-specific b parameter	not used	5.300E+00		---	BUZ(1)
R015		Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01		---	HCUZ(1)
R016		Distribution coefficients for Co-60					
R016		Contaminated zone (cm**3/g)	1.000E+03	1.000E+03		---	DCNUCC(2)
R016		Unsat. zone 1 (cm**3/g)	not used	1.000E+03		---	DCNUCU(2,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+03		---	DCNUCS(2)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.191E-04	ALEACH(2)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(2)
R016		Distribution coefficients for Cs-137					
R016		Contaminated zone (cm**3/g)	1.700E+02	1.000E+03		---	DCNUCC(3)
R016		Unsat. zone 1 (cm**3/g)	not used	1.000E+03		---	DCNUCU(3,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+03		---	DCNUCS(3)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		7.000E-04	ALEACH(3)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(3)
R016		Distribution coefficients for Pu-239					
R016		Contaminated zone (cm**3/g)	2.000E+03	2.000E+03		---	DCNUCC(7)
R016		Unsat. zone 1 (cm**3/g)	not used	2.000E+03		---	DCNUCU(7,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+03		---	DCNUCS(7)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		5.956E-05	ALEACH(7)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(7)
R016		Distribution coefficients for U-234					
R016		Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC(10)
R016		Unsat. zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU(10,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS(10)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		3.385E-03	ALEACH(10)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(10)
R016		Distribution coefficients for U-235					
R016		Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC(11)
R016		Unsat. zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU(11,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS(11)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		3.385E-03	ALEACH(11)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(11)

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
		Distribution coefficients for U-238					
R016		Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC (12)
R016		Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (12,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (12)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		3.385E-03	ALEACH (12)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (12)
		Distribution coefficients for daughter Ac-227					
R016		Contaminated zone (cm**3/g)	2.000E+01	2.000E+01		---	DCNUCC (1)
R016		Unsaturated zone 1 (cm**3/g)	not used	2.000E+01		---	DCNUCU (1,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+01		---	DCNUCS (1)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		5.900E-03	ALEACH (1)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (1)
		Distribution coefficients for daughter Pa-231					
R016		Contaminated zone (cm**3/g)	5.000E+01	5.000E+01		---	DCNUCC (4)
R016		Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (4,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (4)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		2.373E-03	ALEACH (4)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (4)
		Distribution coefficients for daughter Pb-210					
R016		Contaminated zone (cm**3/g)	1.000E+02	1.000E+02		---	DCNUCC (5)
R016		Unsaturated zone 1 (cm**3/g)	not used	1.000E+02		---	DCNUCU (5,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+02		---	DCNUCS (5)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.189E-03	ALEACH (5)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (5)
		Distribution coefficients for daughter Po-210					
R016		Contaminated zone (cm**3/g)	1.000E+01	1.000E+01		---	DCNUCC (6)
R016		Unsaturated zone 1 (cm**3/g)	not used	1.000E+01		---	DCNUCU (6,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+01		---	DCNUCS (6)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.169E-02	ALEACH (6)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (6)
		Distribution coefficients for daughter Ra-226					
R016		Contaminated zone (cm**3/g)	7.000E+01	7.000E+01		---	DCNUCC (8)
R016		Unsaturated zone 1 (cm**3/g)	not used	7.000E+01		---	DCNUCU (8,1)
R016		Saturated zone (cm**3/g)	not used	7.000E+01		---	DCNUCS (8)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.697E-03	ALEACH (8)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (8)
		Distribution coefficients for daughter Th-230					
R016		Contaminated zone (cm**3/g)	6.000E+04	6.000E+04		---	DCNUCC (9)
R016		Unsaturated zone 1 (cm**3/g)	not used	6.000E+04		---	DCNUCU (9,1)
R016		Saturated zone (cm**3/g)	not used	6.000E+04		---	DCNUCS (9)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.985E-06	ALEACH (9)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (9)
R017		Inhalation rate (m**3/yr)	1.230E+04	8.400E+03		---	INHALR
R017		Mass loading for inhalation (g/m**3)	6.000E-04	1.000E-04		---	MLINH

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
R017		Exposure duration	2.500E+01	3.000E+01		---	ED
R017		Shielding factor, inhalation	1.000E+00	4.000E-01		---	SHF3
R017		Shielding factor, external gamma	1.000E+00	7.000E-01		---	SHF1
R017		Fraction of time spent indoors	0.000E+00	5.000E-01		---	FIND
R017		Fraction of time spent outdoors (on site)	3.800E-02	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)	2.010E+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

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
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		---	RDY(1)
R19B		Dry Foliar Interception Fraction for Leafy	not used	2.500E-01		---	RDY(2)
R19B		Dry Foliar Interception Fraction for Fodder	not used	2.500E-01		---	RDY(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
C14		DCF correction factor for gaseous forms of C14	not used	8.894E+01		---	CO2F
STOR		Storage times of contaminated foodstuffs (days) :					
STOR		Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01		---	STOR_T(1)
STOR		Leafy vegetables	1.000E+00	1.000E+00		---	STOR_T(2)
STOR		Milk	1.000E+00	1.000E+00		---	STOR_T(3)
STOR		Meat and poultry	2.000E+01	2.000E+01		---	STOR_T(4)
STOR		Fish	7.000E+00	7.000E+00		---	STOR_T(5)
STOR		Crustacea and mollusks	7.000E+00	7.000E+00		---	STOR_T(6)
STOR		Well water	1.000E+00	1.000E+00		---	STOR_T(7)
STOR		Surface water	1.000E+00	1.000E+00		---	STOR_T(8)
STOR		Livestock fodder	4.500E+01	4.500E+01		---	STOR_T(9)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
0						
R021	Thickness of building foundation (m)	not used	1.500E-01		---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00		---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01		---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01		---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02		---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02		---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec) :					
R021	in cover material	not used	2.000E-06		---	DIFCV
R021	in foundation material	not used	3.000E-07		---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06		---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00		---	HMX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01		---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00		---	HRM
R021	Building interior area factor	not used	0.000E+00		---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00		---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01		---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01		---	EMANA(2)
TITL	Number of graphical time points	32	---		---	NPTS
TITL	Maximum number of integration points for dose	17	---		---	LYMAX
TITL	Maximum number of integration points for risk	1	---		---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	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	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	10.00 square meters	Co-60	1.400E+02
Thickness:	0.61 meters	Cs-137	4.600E-01
Cover Depth:	0.00 meters	Pu-239	2.510E-01
		U-234	1.090E+00
		U-235	8.000E-02
		U-238	1.100E+00

0

Total Dose TDose(t), mrem/yr

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

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

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDose(t):	3.708E+01	3.251E+01	2.499E+01	9.963E+00	7.369E-01	1.052E-02	4.845E-03	0.000E+00
M(t):	1.483E+00	1.300E+00	9.997E-01	3.985E-01	2.948E-02	4.210E-04	1.938E-04	0.000E+00

0Maximum TDose(t): 3.708E+01 mrem/yr at t = 0.000E+00 years

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

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	3.704E+01	0.9990	4.610E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.695E-05	0.0000
Cs-137	2.733E-02	0.0007	2.327E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.736E-07	0.0000
Pu-239	1.487E-06	0.0000	1.728E-03	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.786E-06	0.0000
U-234	8.793E-06	0.0000	2.305E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.352E-06	0.0000
U-235	1.135E-03	0.0000	1.577E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.629E-07	0.0000
U-238	2.984E-03	0.0001	2.079E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.256E-06	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	3.707E+01	0.9998	6.731E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.868E-05	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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.704E+01	0.9990
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.733E-02	0.0007
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.736E-03	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.316E-03	0.0001
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	1.293E-03	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.066E-03	0.0001
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	3.708E+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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	3.247E+01	0.9988	4.041E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.363E-05	0.0000
Cs-137	2.669E-02	0.0008	2.272E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.695E-07	0.0000
Pu-239	1.487E-06	0.0000	1.728E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.786E-06	0.0000
U-234	8.764E-06	0.0000	2.297E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.344E-06	0.0000
U-235	1.131E-03	0.0000	1.572E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.625E-07	0.0000
U-238	2.974E-03	0.0001	2.072E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.249E-06	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	3.250E+01	0.9998	6.659E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.534E-05	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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.247E+01	0.9989
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.669E-02	0.0008
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.736E-03	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.308E-03	0.0001
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	1.289E-03	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.049E-03	0.0002
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	3.251E+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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	2.496E+01	0.9986	3.106E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.816E-05	0.0000
Cs-137	2.544E-02	0.0010	2.167E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.616E-07	0.0000
Pu-239	1.487E-06	0.0000	1.727E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.785E-06	0.0000
U-234	8.709E-06	0.0000	2.282E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.328E-06	0.0000
U-235	1.124E-03	0.0000	1.562E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.617E-07	0.0000
U-238	2.954E-03	0.0001	2.058E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.233E-06	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	2.499E+01	0.9997	6.535E-03	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.983E-05	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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.496E+01	0.9986
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.545E-02	0.0010
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.736E-03	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.293E-03	0.0001
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	1.280E-03	0.0001
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.015E-03	0.0002
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	2.499E+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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	9.931E+00	0.9968	1.236E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.227E-06	0.0000
Cs-137	2.154E-02	0.0022	1.834E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.368E-07	0.0000
Pu-239	1.486E-06	0.0000	1.726E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.780E-06	0.0000
U-234	8.547E-06	0.0000	2.229E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.274E-06	0.0000
U-235	1.098E-03	0.0001	1.530E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.591E-07	0.0000
U-238	2.885E-03	0.0003	2.010E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.181E-06	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	9.957E+00	0.9994	6.242E-03	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.876E-05	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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.932E+00	0.9968
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.154E-02	0.0022
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.735E-03	0.0002
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.240E-03	0.0002
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	1.251E-03	0.0001
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.897E-03	0.0005
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	9.963E+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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	7.140E-01	0.9688	8.888E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.197E-07	0.0000
Cs-137	1.338E-02	0.0182	1.139E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.500E-08	0.0000
Pu-239	1.483E-06	0.0000	1.723E-03	0.0023	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.768E-06	0.0000
U-234	8.317E-06	0.0000	2.084E-03	0.0028	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.126E-06	0.0000
U-235	1.026E-03	0.0014	1.452E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.528E-07	0.0000
U-238	2.696E-03	0.0037	1.879E-03	0.0025	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.039E-06	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	7.311E-01	0.9921	5.840E-03	0.0079	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.169E-05	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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.140E-01	0.9689
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.338E-02	0.0182
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.732E-03	0.0023
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.094E-03	0.0028
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	1.172E-03	0.0016
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.577E-03	0.0062
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	7.369E-01	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	7.108E-05	0.0068	8.861E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.180E-11	0.0000
Cs-137	2.527E-03	0.2401	2.153E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.606E-08	0.0000
Pu-239	1.474E-06	0.0001	1.713E-03	0.1627	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.727E-06	0.0006
U-234	9.797E-06	0.0009	1.647E-03	0.1565	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.680E-06	0.0002
U-235	8.128E-04	0.0772	1.240E-04	0.0118	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.359E-07	0.0000
U-238	2.126E-03	0.2020	1.483E-03	0.1409	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.609E-06	0.0002
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	5.548E-03	0.5272	4.966E-03	0.4719	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.017E-05	0.0010

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.108E-05	0.0068
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.527E-03	0.2401
Pu-239	0.000E+00	0.0000	0.000E+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-03	0.1635
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	1.658E-03	0.1576
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	9.370E-04	0.0890
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	3.611E-03	0.3431
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	1.052E-02	1.0000

0*Sum of all water independent and dependent pathways.

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

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	2.424E-16	0.0000	3.273E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.914E-22	0.0000
Cs-137	2.041E-05	0.0042	1.842E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.374E-10	0.0000
Pu-239	1.417E-06	0.0003	1.683E-03	0.3473	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.609E-06	0.0014
U-234	2.379E-05	0.0049	8.439E-04	0.1742	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.652E-07	0.0002
U-235	4.063E-04	0.0839	8.058E-05	0.0166	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.634E-08	0.0000
U-238	1.024E-03	0.2113	7.539E-04	0.1556	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.180E-07	0.0002
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	1.476E-03	0.3046	3.361E-03	0.6937	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.389E-06	0.0017

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.424E-16	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.041E-05	0.0042
Pu-239	0.000E+00	0.0000	0.000E+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-03	0.3489
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	8.685E-04	0.1793
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	4.870E-04	0.1005
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	1.779E-03	0.3671
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	4.845E-03	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

*Sum of all water independent and dependent pathways.

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

0Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g)									
			t= 0.000E+00 1.000E+00 3.000E+00 1.000E+01 3.000E+01 1.000E+02 3.000E+02 1.000E+03									
Co-60	Co-60	1.000E+00	2.646E-01	2.319E-01	1.783E-01	7.094E-02	5.100E-03	5.077E-07	1.731E-18	0.000E+00		
0Cs-137	Cs-137	1.000E+00	5.941E-02	5.801E-02	5.532E-02	4.682E-02	2.909E-02	5.493E-03	4.438E-05	0.000E+00		
0Pu-239	Pu-239	1.000E+00	6.917E-03	6.916E-03	6.915E-03	6.911E-03	6.899E-03	6.856E-03	6.736E-03	0.000E+00		
Pu-239	U-235	1.000E+00	7.964E-12	2.385E-11	5.547E-11	1.644E-10	4.615E-10	1.352E-09	2.886E-09	0.000E+00		
Pu-239	Pa-231	1.000E+00	8.381E-17	5.857E-16	3.084E-15	2.722E-14	2.207E-13	2.094E-12	1.284E-11	0.000E+00		
Pu-239	Ac-227	1.000E+00	3.970E-18	5.900E-17	6.742E-16	1.661E-14	3.329E-13	6.634E-12	5.654E-11	0.000E+00		
Pu-239	SDSR(j)		6.917E-03	6.916E-03	6.915E-03	6.911E-03	6.899E-03	6.856E-03	6.736E-03	0.000E+00		
0U-234	U-234	1.000E+00	2.125E-03	2.118E-03	2.103E-03	2.054E-03	1.919E-03	1.514E-03	7.690E-04	0.000E+00		
U-234	Th-230	1.000E+00	2.364E-08	7.082E-08	1.647E-07	4.883E-07	1.372E-06	4.030E-06	8.907E-06	0.000E+00		
U-234	Ra-226	1.000E+00	1.276E-10	8.921E-10	4.699E-09	4.150E-08	3.373E-07	3.223E-06	1.887E-05	0.000E+00		
U-234	Pb-210	1.000E+00	1.919E-15	2.856E-14	3.272E-13	8.140E-12	1.671E-10	3.525E-09	3.247E-08	0.000E+00		
U-234	Po-210	1.000E+00	2.316E-16	5.635E-15	9.354E-14	3.035E-12	6.869E-11	1.502E-09	1.396E-08	0.000E+00		
U-234	SDSR(j)		2.125E-03	2.118E-03	2.104E-03	2.055E-03	1.921E-03	1.521E-03	7.968E-04	0.000E+00		
0U-235	U-235	1.000E+00	1.616E-02	1.611E-02	1.600E-02	1.563E-02	1.460E-02	1.152E-02	5.706E-03	0.000E+00		
U-235	Pa-231	1.000E+00	2.552E-07	7.635E-07	1.771E-06	5.208E-06	1.428E-05	3.845E-05	6.437E-05	0.000E+00		
U-235	Ac-227	1.000E+00	1.609E-08	1.112E-07	5.718E-07	4.639E-06	3.005E-05	1.522E-04	3.174E-04	0.000E+00		
U-235	SDSR(j)		1.616E-02	1.611E-02	1.600E-02	1.564E-02	1.465E-02	1.171E-02	6.087E-03	0.000E+00		
0U-238	U-238	1.000E+00	4.606E-03	4.590E-03	4.559E-03	4.452E-03	4.161E-03	3.282E-03	1.616E-03	0.000E+00		
U-238	U-234	1.000E+00	3.010E-09	9.004E-09	2.087E-08	6.114E-08	1.660E-07	4.315E-07	6.554E-07	0.000E+00		
U-238	Th-230	1.000E+00	2.233E-14	1.560E-13	8.210E-13	7.230E-12	5.829E-11	5.417E-10	3.164E-09	0.000E+00		
U-238	Ra-226	1.000E+00	9.043E-17	1.354E-15	1.573E-14	4.107E-13	9.608E-12	2.943E-10	4.752E-09	0.000E+00		
U-238	Pb-210	1.000E+00	1.089E-21	3.352E-20	8.315E-19	6.146E-17	3.732E-15	2.712E-13	7.545E-12	0.000E+00		
U-238	Po-210	1.000E+00	1.136E-22	5.800E-21	2.152E-19	2.189E-17	1.507E-15	1.149E-13	3.240E-12	0.000E+00		
U-238	SDSR(j)		4.606E-03	4.590E-03	4.559E-03	4.452E-03	4.161E-03	3.282E-03	1.617E-03	0.000E+00		

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
\$ is used to indicate summations; the Greek sigma is not included in this font.
The DSR includes contributions from associated (half-life <= 30 days) daughters.

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

0Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Co-60	9.449E+01	1.078E+02	1.402E+02	3.524E+02	4.902E+03	4.924E+07	*1.131E+15	*1.131E+15
Cs-137	4.208E+02	4.309E+02	4.519E+02	5.339E+02	8.595E+02	4.551E+03	5.633E+05	*8.701E+13
Pu-239	3.614E+03	3.615E+03	3.615E+03	3.618E+03	3.624E+03	3.646E+03	3.712E+03	*6.212E+10
U-234	1.177E+04	1.181E+04	1.188E+04	1.217E+04	1.301E+04	1.643E+04	3.137E+04	*6.245E+09
U-235	1.547E+03	1.552E+03	1.562E+03	1.599E+03	1.707E+03	2.134E+03	4.107E+03	*2.160E+06
U-238	5.428E+03	5.447E+03	5.484E+03	5.615E+03	6.009E+03	7.617E+03	1.546E+04	*3.360E+05
*At specific activity limit								

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g) and Single Radionuclide Soil Guidelines G(i,t) in pCi/g at tmin = time of minimum single radionuclide soil guideline and at tmax = time of maximum total dose = 0.000E+00 years									
ONuclide	Initial	tmin	DSR(i,tmin)	G(i,tmin)	DSR(i,tmax)	G(i,tmax)			
(i)	(pCi/g)	(years)		(pCi/g)		(pCi/g)			
Co-60	1.400E+02	0.000E+00	2.646E-01	9.449E+01	2.646E-01	9.449E+01			
Cs-137	4.600E-01	0.000E+00	5.941E-02	4.208E+02	5.941E-02	4.208E+02			
Pu-239	2.510E-01	0.000E+00	6.917E-03	3.614E+03	6.917E-03	3.614E+03			
U-234	1.090E+00	0.000E+00	2.125E-03	1.177E+04	2.125E-03	1.177E+04			
U-235	8.000E-02	0.000E+00	1.616E-02	1.547E+03	1.616E-02	1.547E+03			
U-238	1.100E+00	0.000E+00	4.606E-03	5.428E+03	4.606E-03	5.428E+03			
=====			=====		=====		=====		

Individual Nuclide Dose Summed Over All Pathways

Parent Nuclide and Branch Fraction Indicated		DOSE(j,t), mrem/yr									
0Nuclide (j)	Parent (i)	BRF(i)	t= 0.000E+00 1.000E+00 3.000E+00 1.000E+01 3.000E+01 1.000E+02 3.000E+02 1.000E+03								
Co-60	Co-60	1.000E+00	3.704E+01	3.247E+01	2.496E+01	9.932E+00	7.140E-01	7.108E-01	2.424E-16	0.000E+00	0.000E+00
Os-137	Cs-137	1.000E+00	2.733E-02	2.669E-02	2.545E-02	2.154E-02	1.338E-02	2.527E-03	2.041E-05	0.000E+00	0.000E+00
Pu-239	Pu-239	1.000E+00	1.736E-03	1.736E-03	1.736E-03	1.735E-03	1.732E-03	1.721E-03	1.691E-03	0.000E+00	0.000E+00
U-235	Pu-239	1.000E+00	1.999E-12	5.988E-12	1.392E-11	4.127E-11	1.158E-10	3.394E-10	7.243E-10	0.000E+00	0.000E+00
U-235	U-235	1.000E+00	1.293E-03	1.289E-03	1.280E-03	1.250E-03	1.168E-03	9.218E-04	4.565E-04	0.000E+00	0.000E+00
U-235	\$DOSE(j)		1.293E-03	1.289E-03	1.280E-03	1.250E-03	1.168E-03	9.218E-04	4.565E-04	0.000E+00	0.000E+00
Pa-231	Pu-239	1.000E+00	2.104E-17	1.470E-16	7.741E-16	6.831E-15	5.540E-14	5.224E-12	3.224E-12	0.000E+00	0.000E+00
Pa-231	U-235	1.000E+00	2.041E-08	6.108E-08	1.417E-07	4.167E-07	1.142E-06	3.076E-06	5.150E-06	0.000E+00	0.000E+00
Pa-231	\$DOSE(j)		2.041E-08	6.108E-08	1.417E-07	4.167E-07	1.142E-06	3.076E-06	5.150E-06	0.000E+00	0.000E+00
Ac-227	Pu-239	1.000E+00	9.964E-19	1.481E-17	1.692E-16	4.170E-15	8.357E-14	1.665E-12	1.419E-11	0.000E+00	0.000E+00
Ac-227	U-235	1.000E+00	1.287E-09	8.899E-09	4.575E-08	3.711E-07	2.404E-06	1.218E-05	2.539E-05	0.000E+00	0.000E+00
Ac-227	\$DOSE(j)		1.287E-09	8.899E-09	4.575E-08	3.711E-07	2.404E-06	1.218E-05	2.539E-05	0.000E+00	0.000E+00
U-234	U-234	1.000E+00	2.316E-03	2.308E-03	2.293E-03	2.239E-03	2.092E-03	1.651E-03	8.382E-04	0.000E+00	0.000E+00
U-234	U-238	1.000E+00	3.311E-09	9.904E-09	2.296E-08	6.726E-08	1.822E-07	4.746E-07	7.209E-07	0.000E+00	0.000E+00
U-234	\$DOSE(j)		2.316E-03	2.308E-03	2.293E-03	2.239E-03	2.092E-03	1.651E-03	8.382E-04	0.000E+00	0.000E+00
Th-230	U-234	1.000E+00	2.577E-08	7.720E-08	1.795E-07	5.323E-07	1.495E-06	4.393E-06	9.709E-06	0.000E+00	0.000E+00
Th-230	U-238	1.000E+00	2.456E-14	1.716E-13	9.031E-13	7.953E-12	6.411E-11	5.959E-10	3.480E-09	0.000E+00	0.000E+00
Th-230	\$DOSE(j)		2.577E-08	7.720E-08	1.795E-07	5.323E-07	1.495E-06	4.393E-06	9.713E-06	0.000E+00	0.000E+00
Ra-226	U-234	1.000E+00	1.391E-10	9.724E-10	5.122E-09	4.523E-08	3.676E-07	3.513E-06	2.057E-05	0.000E+00	0.000E+00
Ra-226	U-238	1.000E+00	9.948E-17	1.489E-15	1.730E-14	4.518E-13	1.057E-11	3.237E-10	5.227E-09	0.000E+00	0.000E+00
Ra-226	\$DOSE(j)		1.391E-10	9.724E-10	5.122E-09	4.523E-08	3.676E-07	3.513E-06	2.058E-05	0.000E+00	0.000E+00
Pb-210	U-234	1.000E+00	2.092E-15	3.113E-14	3.567E-13	8.873E-12	1.821E-10	3.842E-09	3.539E-08	0.000E+00	0.000E+00
Pb-210	U-238	1.000E+00	1.198E-21	3.687E-20	9.146E-19	6.760E-17	4.105E-15	2.983E-13	8.300E-12	0.000E+00	0.000E+00
Pb-210	\$DOSE(j)		2.092E-15	3.113E-14	3.567E-13	8.873E-12	1.821E-10	3.843E-09	3.540E-08	0.000E+00	0.000E+00
Po-210	U-234	1.000E+00	2.524E-16	6.142E-15	1.020E-13	3.308E-12	7.487E-11	1.637E-09	1.522E-08	0.000E+00	0.000E+00
Po-210	U-238	1.000E+00	1.250E-22	6.380E-21	2.367E-19	2.408E-17	1.658E-15	1.264E-13	3.564E-12	0.000E+00	0.000E+00
Po-210	\$DOSE(j)		2.524E-16	6.142E-15	1.020E-13	3.308E-12	7.488E-11	1.638E-09	1.522E-08	0.000E+00	0.000E+00
U-238	U-238	1.000E+00	5.066E-03	5.049E-03	5.015E-03	4.897E-03	4.577E-03	3.610E-03	1.778E-03	0.000E+00	0.000E+00

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

S is used to indicate summation; the Greek sigma is not included in this font.

Individual Nuclide Soil Concentration									
Parent Nuclide and Branch Fraction Indicated		S(j,t), pCi/g							
0Nuclide Parent (i)	BRF(i)	t= 0.000E+00 1.000E+00 3.000E+00 1.000E+01 2.699E+00 2.691E-04 3.000E+01 1.000E+02 3.000E+02 1.000E+03							
Co-60	1.000E+00	1.400E+02	1.227E+02	9.433E+01	3.754E+01	2.699E+00	2.691E-04	9.941E-16	0.000E+00
0Cs-137	1.000E+00	4.600E-01	4.492E-01	4.283E-01	3.626E-01	2.252E-01	4.255E-02	3.641E-04	2.111E-11
0Pu-239	1.000E+00	2.510E-01	2.510E-01	2.509E-01	2.508E-01	2.503E-01	2.488E-01	2.444E-01	2.298E-01
0U-235	1.000E+00	0.000E+00	2.468E-10	7.378E-10	2.430E-09	7.042E-09	2.087E-08	4.586E-08	6.610E-08
U-235	1.000E+00	8.000E-02	7.973E-02	7.919E-02	7.734E-02	7.227E-02	5.703E-02	2.898E-02	2.710E-03
SS(j) :		8.000E-02	7.973E-02	7.919E-02	7.734E-02	7.227E-02	5.703E-02	2.898E-02	2.710E-03
0Pa-231	1.000E+00	0.000E+00	2.610E-15	2.340E-14	2.565E-13	2.220E-12	2.156E-11	1.338E-10	4.752E-10
Pa-231	1.000E+00	0.000E+00	2.610E-15	2.340E-14	2.565E-13	2.220E-12	2.156E-11	1.338E-10	4.752E-10
Pa-231	SS(j) :	0.000E+00	1.688E-06	5.034E-06	1.644E-05	4.656E-05	1.268E-04	2.142E-04	9.798E-05
0Ac-227	1.000E+00	0.000E+00	1.688E-06	5.034E-06	1.644E-05	4.656E-05	1.268E-04	2.142E-04	9.798E-05
Ac-227	1.000E+00	0.000E+00	2.745E-17	7.253E-16	2.494E-14	5.515E-13	1.137E-11	9.862E-11	3.947E-10
Ac-227	SS(j) :	0.000E+00	2.656E-08	2.322E-07	2.338E-06	1.615E-05	8.363E-05	1.769E-04	8.676E-05
0U-234	1.000E+00	0.000E+00	2.656E-08	2.322E-07	2.338E-06	1.615E-05	8.363E-05	1.769E-04	8.676E-05
U-234	1.000E+00	1.090E+00	1.086E+00	1.079E+00	1.054E+00	9.847E-01	7.768E-01	3.945E-01	3.682E-02
U-234	SS(j) :	0.000E+00	3.108E-06	9.261E-06	3.015E-05	8.452E-05	2.223E-04	3.387E-04	1.055E-04
0Th-230	1.000E+00	1.090E+00	1.086E+00	1.079E+00	1.054E+00	9.847E-01	7.770E-01	3.948E-01	3.692E-02
Th-230	1.000E+00	0.000E+00	1.400E-11	1.255E-10	1.372E-09	1.181E-08	1.123E-07	6.603E-07	2.072E-06
Th-230	SS(j) :	0.000E+00	9.795E-06	2.929E-05	9.647E-05	2.799E-04	8.318E-04	1.845E-03	2.778E-03
0Ra-226	1.000E+00	0.000E+00	2.121E-09	1.902E-08	2.087E-07	1.810E-06	1.772E-05	1.125E-04	4.318E-04
Ra-226	1.000E+00	0.000E+00	2.022E-15	5.436E-14	1.982E-12	5.120E-11	1.625E-09	2.854E-08	2.691E-07
Ra-226	SS(j) :	0.000E+00	2.121E-09	1.902E-08	2.087E-07	1.810E-06	1.772E-05	1.125E-04	4.321E-04
0Pb-210	1.000E+00	0.000E+00	2.181E-11	5.780E-10	2.007E-08	4.545E-07	9.920E-06	9.218E-05	4.070E-04
Pb-210	1.000E+00	0.000E+00	1.562E-17	1.245E-15	1.452E-13	1.007E-11	7.661E-10	2.158E-08	2.492E-07
Pb-210	SS(j) :	0.000E+00	2.181E-11	5.780E-10	2.007E-08	4.546E-07	9.921E-06	9.220E-05	4.072E-04
0Po-210	1.000E+00	0.000E+00	7.202E-12	3.561E-10	1.710E-08	4.299E-07	9.733E-06	9.131E-05	4.043E-04
Po-210	1.000E+00	0.000E+00	4.340E-18	6.849E-16	1.179E-13	9.354E-12	7.475E-10	2.135E-08	2.475E-07
Po-210	SS(j) :	0.000E+00	7.202E-12	3.561E-10	1.710E-08	4.299E-07	9.734E-06	9.133E-05	4.045E-04
0U-238	1.000E+00	1.100E+00	1.096E+00	1.089E+00	1.063E+00	9.938E-01	7.841E-01	3.984E-01	3.726E-02
U-238	1.000E+00	1.100E+00	1.096E+00	1.089E+00	1.063E+00	9.938E-01	7.841E-01	3.984E-01	3.726E-02

BRF(i) is the branch fraction of the parent nuclide.
S is used to indicate summation; the Greek sigma is not included in this font.
0RESCALC.EXE execution time = 2.50 seconds

Exhibit 4

RESRAD Scenario CAS 10-09-06 Hot Spot 1m²

(23 Pages)

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines
=====

Dose Conversion Factor (and Related) Parameter Summary ...	2
Site-Specific Parameter Summary	5
Summary of Pathway Selections	10
Contaminated Zone and Total Dose Summary	11
Total Dose Components	
Time = 0.000E+00	12
Time = 1.000E+00	13
Time = 3.000E+00	14
Time = 1.000E+01	15
Time = 3.000E+01	16
Time = 1.000E+02	17
Time = 3.000E+02	18
Time = 1.000E+03	19
Dose/Source Ratios Summed Over All Pathways	20
Single Radionuclide Soil Guidelines	20
Dose Per Nuclide Summed Over All Pathways	22
Soil Concentration Per Nuclide	23

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	Co-60	2.190E-04	2.190E-04	DCF2 (2)
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2 (3)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2 (4)
B-1	Pb-210+D	1.380E-02	1.380E-02	DCF2 (5)
B-1	Po-210	9.400E-03	9.400E-03	DCF2 (6)
B-1	Pu-239	4.290E-01	4.290E-01	DCF2 (7)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2 (8)
B-1	Th-230	3.260E-01	3.260E-01	DCF2 (9)
B-1	U-234	1.320E-01	1.320E-01	DCF2 (10)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2 (11)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2 (12)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3 (1)
D-1	Co-60	2.690E-05	2.690E-05	DCF3 (2)
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3 (3)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3 (4)
D-1	Pb-210+D	5.370E-03	5.370E-03	DCF3 (5)
D-1	Po-210	1.900E-03	1.900E-03	DCF3 (6)
D-1	Pu-239	3.540E-03	3.540E-03	DCF3 (7)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3 (8)
D-1	Th-230	5.480E-04	5.480E-04	DCF3 (9)
D-1	U-234	2.830E-04	2.830E-04	DCF3 (10)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3 (11)
D-1	U-238+D	2.690E-04	2.690E-04	DCF3 (12)
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	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF (2,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF (2,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF (2,3)
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF (3,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF (3,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF (3,3)
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF (4,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF (4,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF (4,3)
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF (5,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF (5,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF (5,3)

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

File: FGR 13 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
0				
D-34	Po-210 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(6,1)
D-34	Po-210 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(6,2)
D-34	Po-210 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.400E-04	3.400E-04	RTF(6,3)
D-34				
D-34	Pu-239 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(7,1)
D-34	Pu-239 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(7,2)
D-34	Pu-239 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(7,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(8,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(8,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(8,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(9,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(9,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(9,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(10,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(10,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(10,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(11,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(11,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(11,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(12,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(12,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(12,3)
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	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(2,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(2,2)
D-5				
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(3,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(4,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(4,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(5,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(5,2)
D-5				
D-5	Po-210 , fish	1.000E+02	1.000E+02	BIOFAC(6,1)
D-5	Po-210 , crustacea and mollusks	2.000E+04	2.000E+04	BIOFAC(6,2)
D-5				
D-5	Pu-239 , fish	3.000E+01	3.000E+01	BIOFAC(7,1)
D-5	Pu-239 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(7,2)
D-5				

Site-Specific Parameter Summary									
0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name		
R011		Area of contaminated zone (m**2)	1.000E+00	1.000E+04		---	AREA		
R011		Thickness of contaminated zone (m)	6.100E-01	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	2.500E+01		---	BRDL		
R011		Time since placement of material (yr)	0.000E+00	0.000E+00		---	TI		
R011		Times for calculations (yr)	1.000E+00	1.000E+00		---	T (2)		
R011		Times for calculations (yr)	3.000E+00	3.000E+00		---	T (3)		
R011		Times for calculations (yr)	1.000E+01	1.000E+01		---	T (4)		
R011		Times for calculations (yr)	3.000E+01	3.000E+01		---	T (5)		
R011		Times for calculations (yr)	1.000E+02	1.000E+02		---	T (6)		
R011		Times for calculations (yr)	3.000E+02	3.000E+02		---	T (7)		
R011		Times for calculations (yr)	1.000E+03	1.000E+03		---	T (8)		
R011		Times for calculations (yr)	not used	0.000E+00		---	T (9)		
R011		Times for calculations (yr)	not used	0.000E+00		---	T(10)		
R012		Initial principal radionuclide (pCi/g): Co-60	1.400E+02	0.000E+00		---	S1 (2)		
R012		Initial principal radionuclide (pCi/g): Cs-137	4.600E-01	0.000E+00		---	S1 (3)		
R012		Initial principal radionuclide (pCi/g): Pu-239	2.510E-01	0.000E+00		---	S1 (7)		
R012		Initial principal radionuclide (pCi/g): U-234	1.090E+00	0.000E+00		---	S1(10)		
R012		Initial principal radionuclide (pCi/g): U-235	8.000E-02	0.000E+00		---	S1(11)		
R012		Initial principal radionuclide (pCi/g): U-238	1.100E+00	0.000E+00		---	S1(12)		
R012		Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00		---	W1 (2)		
R012		Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00		---	W1 (3)		
R012		Concentration in groundwater (pCi/L): Pu-239	not used	0.000E+00		---	W1 (7)		
R012		Concentration in groundwater (pCi/L): U-234	not used	0.000E+00		---	W1(10)		
R012		Concentration in groundwater (pCi/L): U-235	not used	0.000E+00		---	W1(11)		
R012		Concentration in groundwater (pCi/L): U-238	not used	0.000E+00		---	W1(12)		
R013		Cover depth (m)	0.000E+00	0.000E+00		---	COVER0		
R013		Density of cover material (g/cm**3)	not used	1.500E+00		---	DENSCV		
R013		Cover depth erosion rate (m/yr)	not used	1.000E-03		---	VCV		
R013		Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00		---	DENSCZ		
R013		Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03		---	VCZ		
R013		Contaminated zone total porosity	4.000E-01	4.000E-01		---	TPCZ		
R013		Contaminated zone field capacity	2.000E-01	2.000E-01		---	FCCZ		
R013		Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01		---	HCCZ		
R013		Contaminated zone b parameter	5.300E+00	5.300E+00		---	BCZ		
R013		Average annual wind speed (m/sec)	3.500E+00	2.000E+00		---	WIND		
R013		Humidity in air (g/m**3)	not used	8.000E+00		---	HUMID		
R013		Evapotranspiration coefficient	5.000E-01	5.000E-01		---	EVAPTR		
R013		Precipitation (m/yr)	3.000E-02	1.000E+00		---	PRECIP		
R013		Irrigation (m/yr)	2.000E-01	2.000E-01		---	RI		
R013		Irrigation mode	overhead	overhead		---	IDITCH		
R013		Runoff coefficient	4.000E-01	2.000E-01		---	RUNOFF		
R013		Watershed area for nearby stream or pond (m**2)	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		

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
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
R015		Unsat. zone 1, thickness (m)	not used	4.000E+00		---	H(1)
R015		Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00		---	DENSUZ(1)
R015		Unsat. zone 1, total porosity	not used	4.000E-01		---	TPUZ(1)
R015		Unsat. zone 1, effective porosity	not used	2.000E-01		---	EPUZ(1)
R015		Unsat. zone 1, field capacity	not used	2.000E-01		---	FCUZ(1)
R015		Unsat. zone 1, soil-specific b parameter	not used	5.300E+00		---	BUZ(1)
R015		Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01		---	HCUZ(1)
R016		Distribution coefficients for Co-60					
R016		Contaminated zone (cm**3/g)	1.000E+03	1.000E+03		---	DCNUCC(2)
R016		Unsat. zone 1 (cm**3/g)	not used	1.000E+03		---	DCNUCU(2,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+03		---	DCNUCS(2)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.191E-04	ALEACH(2)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(2)
R016		Distribution coefficients for Cs-137					
R016		Contaminated zone (cm**3/g)	1.700E+02	1.000E+03		---	DCNUCC(3)
R016		Unsat. zone 1 (cm**3/g)	not used	1.000E+03		---	DCNUCU(3,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+03		---	DCNUCS(3)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		7.000E-04	ALEACH(3)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(3)
R016		Distribution coefficients for Pu-239					
R016		Contaminated zone (cm**3/g)	2.000E+03	2.000E+03		---	DCNUCC(7)
R016		Unsat. zone 1 (cm**3/g)	not used	2.000E+03		---	DCNUCU(7,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+03		---	DCNUCS(7)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		5.956E-05	ALEACH(7)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(7)
R016		Distribution coefficients for U-234					
R016		Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC(10)
R016		Unsat. zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU(10,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS(10)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		3.385E-03	ALEACH(10)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(10)
R016		Distribution coefficients for U-235					
R016		Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC(11)
R016		Unsat. zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU(11,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS(11)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		3.385E-03	ALEACH(11)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK(11)

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
		Distribution coefficients for U-238					
R016		Contaminated zone (cm**3/g)	3.500E+01	5.000E+01		---	DCNUCC (12)
R016		Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (12,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (12)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		3.385E-03	ALEACH (12)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (12)
		Distribution coefficients for daughter Ac-227					
R016		Contaminated zone (cm**3/g)	2.000E+01	2.000E+01		---	DCNUCC (1)
R016		Unsaturated zone 1 (cm**3/g)	not used	2.000E+01		---	DCNUCU (1,1)
R016		Saturated zone (cm**3/g)	not used	2.000E+01		---	DCNUCS (1)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		5.900E-03	ALEACH (1)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (1)
		Distribution coefficients for daughter Pa-231					
R016		Contaminated zone (cm**3/g)	5.000E+01	5.000E+01		---	DCNUCC (4)
R016		Unsaturated zone 1 (cm**3/g)	not used	5.000E+01		---	DCNUCU (4,1)
R016		Saturated zone (cm**3/g)	not used	5.000E+01		---	DCNUCS (4)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		2.373E-03	ALEACH (4)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (4)
		Distribution coefficients for daughter Pb-210					
R016		Contaminated zone (cm**3/g)	1.000E+02	1.000E+02		---	DCNUCC (5)
R016		Unsaturated zone 1 (cm**3/g)	not used	1.000E+02		---	DCNUCU (5,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+02		---	DCNUCS (5)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.189E-03	ALEACH (5)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (5)
		Distribution coefficients for daughter Po-210					
R016		Contaminated zone (cm**3/g)	1.000E+01	1.000E+01		---	DCNUCC (6)
R016		Unsaturated zone 1 (cm**3/g)	not used	1.000E+01		---	DCNUCU (6,1)
R016		Saturated zone (cm**3/g)	not used	1.000E+01		---	DCNUCS (6)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.169E-02	ALEACH (6)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (6)
		Distribution coefficients for daughter Ra-226					
R016		Contaminated zone (cm**3/g)	7.000E+01	7.000E+01		---	DCNUCC (8)
R016		Unsaturated zone 1 (cm**3/g)	not used	7.000E+01		---	DCNUCU (8,1)
R016		Saturated zone (cm**3/g)	not used	7.000E+01		---	DCNUCS (8)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.697E-03	ALEACH (8)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (8)
		Distribution coefficients for daughter Th-230					
R016		Contaminated zone (cm**3/g)	6.000E+04	6.000E+04		---	DCNUCC (9)
R016		Unsaturated zone 1 (cm**3/g)	not used	6.000E+04		---	DCNUCU (9,1)
R016		Saturated zone (cm**3/g)	not used	6.000E+04		---	DCNUCS (9)
R016		Leach rate (/yr)	0.000E+00	0.000E+00		1.985E-06	ALEACH (9)
R016		Solubility constant	0.000E+00	0.000E+00		not used	SOLUBK (9)
R017		Inhalation rate (m**3/yr)	1.230E+04	8.400E+03		---	INHALR
R017		Mass loading for inhalation (g/m**3)	6.000E-04	1.000E-04		---	MLINH

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
R017		Exposure duration	2.500E+01	3.000E+01		---	ED
R017		Shielding factor, inhalation	1.000E+00	4.000E-01		---	SHF3
R017		Shielding factor, external gamma	1.000E+00	7.000E-01		---	SHF1
R017		Fraction of time spent indoors	0.000E+00	5.000E-01		---	FIND
R017		Fraction of time spent outdoors (on site)	3.800E-02	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)	2.010E+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

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
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		---	RDY(1)
R19B		Dry Foliar Interception Fraction for Leafy	not used	2.500E-01		---	RDY(2)
R19B		Dry Foliar Interception Fraction for Fodder	not used	2.500E-01		---	RDY(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
C14		DCF correction factor for gaseous forms of C14	not used	8.894E+01		---	CO2F
STOR		Storage times of contaminated foodstuffs (days) :					
STOR		Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01		---	STOR_T(1)
STOR		Leafy vegetables	1.000E+00	1.000E+00		---	STOR_T(2)
STOR		Milk	1.000E+00	1.000E+00		---	STOR_T(3)
STOR		Meat and poultry	2.000E+01	2.000E+01		---	STOR_T(4)
STOR		Fish	7.000E+00	7.000E+00		---	STOR_T(5)
STOR		Crustacea and mollusks	7.000E+00	7.000E+00		---	STOR_T(6)
STOR		Well water	1.000E+00	1.000E+00		---	STOR_T(7)
STOR		Surface water	1.000E+00	1.000E+00		---	STOR_T(8)
STOR		Livestock fodder	4.500E+01	4.500E+01		---	STOR_T(9)

Site-Specific Parameter Summary (continued)

0	Menu	Parameter	User Input	Default	(If different from user input)	Used by RESRAD	Parameter Name
R021		Thickness of building foundation (m)	not used	1.500E-01		---	FLOOR1
R021		Bulk density of building foundation (g/cm**3)	not used	2.400E+00		---	DENSFL
R021		Total porosity of the cover material	not used	4.000E-01		---	TPCV
R021		Total porosity of the building foundation	not used	1.000E-01		---	TPFL
R021		Volumetric water content of the cover material	not used	5.000E-02		---	PH2OCV
R021		Volumetric water content of the foundation	not used	3.000E-02		---	PH2OFL
R021		Diffusion coefficient for radon gas (m/sec) :					
R021		in cover material	not used	2.000E-06		---	DIFCV
R021		in foundation material	not used	3.000E-07		---	DIFFL
R021		in contaminated zone soil	not used	2.000E-06		---	DIFCZ
R021		Radon vertical dimension of mixing (m)	not used	2.000E+00		---	HMX
R021		Average building air exchange rate (1/hr)	not used	5.000E-01		---	REXG
R021		Height of the building (room) (m)	not used	2.500E+00		---	HRM
R021		Building interior area factor	not used	0.000E+00		---	FAI
R021		Building depth below ground surface (m)	not used	-1.000E+00		---	DMFL
R021		Emanating power of Rn-222 gas	not used	2.500E-01		---	EMANA(1)
R021		Emanating power of Rn-220 gas	not used	1.500E-01		---	EMANA(2)
TITL		Number of graphical time points	32	---		---	NPTS
TITL		Maximum number of integration points for dose	17	---		---	LYMAX
TITL		Maximum number of integration points for risk	1	---		---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	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	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	1.00 square meters	Co-60	1.400E+02
Thickness:	0.61 meters	Cs-137	4.600E-01
Cover Depth:	0.00 meters	Pu-239	2.510E-01
		U-234	1.090E+00
		U-235	8.000E-02
		U-238	1.100E+00

0

Total Dose TDose(t), mrem/yr	
Basic Radiation Dose Limit = 2.500E+01 mrem/yr	
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)	
t (years):	0.000E+00 1.000E+00 3.000E+00 1.000E+01 3.000E+01 1.000E+02 3.000E+02 1.000E+03
TDose(t):	8.006E+00 7.019E+00 5.397E+00 2.154E+00 1.624E-01 5.083E-03 2.927E-03 0.000E+00
M(t):	3.202E-01 2.808E-01 2.159E-01 8.615E-02 6.495E-03 2.033E-04 1.171E-04 0.000E+00
Maximum TDose(t): 8.006E+00 mrem/yr at t = 0.000E+00 years	

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

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	7.993E+00	0.9985	3.578E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.695E-06	0.0000
Cs-137	6.011E-03	0.0008	1.806E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.736E-08	0.0000
Pu-239	3.538E-07	0.0000	1.341E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.786E-07	0.0000
U-234	2.137E-06	0.0000	1.789E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.352E-07	0.0000
U-235	2.553E-04	0.0000	1.224E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.629E-08	0.0000
U-238	6.619E-04	0.0001	1.614E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.256E-07	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	8.000E+00	0.9993	5.224E-03	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.868E-06	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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.994E+00	0.9985
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.011E-03	0.0008
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.342E-03	0.0002
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.791E-03	0.0002
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	3.777E-04	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.276E-03	0.0003
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	8.006E+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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	7.007E+00	0.9983	3.136E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.363E-06	0.0000
Cs-137	5.869E-03	0.0008	1.763E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.695E-08	0.0000
Pu-239	3.537E-07	0.0000	1.341E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.786E-07	0.0000
U-234	2.130E-06	0.0000	1.783E-03	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.344E-07	0.0000
U-235	2.544E-04	0.0000	1.220E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.625E-08	0.0000
U-238	6.597E-04	0.0001	1.608E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.249E-07	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	7.014E+00	0.9993	5.168E-03	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.534E-06	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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.008E+00	0.9983
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.870E-03	0.0008
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.342E-03	0.0002
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.785E-03	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	3.764E-04	0.0001
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	2.268E-03	0.0003
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	7.019E+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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	5.386E+00	0.9979	2.411E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.816E-06	0.0000
Cs-137	5.597E-03	0.0010	1.681E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.616E-08	0.0000
Pu-239	3.537E-07	0.0000	1.341E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.785E-07	0.0000
U-234	2.117E-06	0.0000	1.771E-03	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.328E-07	0.0000
U-235	2.527E-04	0.0000	1.212E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.617E-08	0.0000
U-238	6.552E-04	0.0001	1.597E-03	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.233E-07	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	5.392E+00	0.9991	5.071E-03	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.983E-06	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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.386E+00	0.9979
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.597E-03	0.0010
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.342E-03	0.0002
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.773E-03	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	3.740E-04	0.0001
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	2.253E-03	0.0004
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	5.397E+00	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	2.143E+00	0.9951	9.594E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.227E-07	0.0000
Cs-137	4.737E-03	0.0022	1.423E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.368E-08	0.0000
Pu-239	3.534E-07	0.0000	1.340E-03	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.780E-07	0.0000
U-234	2.076E-06	0.0000	1.730E-03	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.274E-07	0.0000
U-235	2.468E-04	0.0001	1.188E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.591E-08	0.0000
U-238	6.399E-04	0.0003	1.560E-03	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.181E-07	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	2.149E+00	0.9977	4.844E-03	0.0022	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.876E-06	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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.143E+00	0.9952
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.738E-03	0.0022
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.341E-03	0.0006
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	1.732E-03	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	3.656E-04	0.0002
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	2.200E-03	0.0010
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	2.154E+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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	1.541E-01	0.9488	6.898E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.197E-08	0.0000
Cs-137	2.943E-03	0.0181	8.842E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.500E-09	0.0000
Pu-239	3.528E-07	0.0000	1.337E-03	0.0082	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.768E-07	0.0000
U-234	2.012E-06	0.0000	1.617E-03	0.0100	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.126E-07	0.0000
U-235	2.308E-04	0.0014	1.127E-04	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.528E-08	0.0000
U-238	5.979E-04	0.0037	1.458E-03	0.0090	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.039E-07	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	1.578E-01	0.9721	4.532E-03	0.0279	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.169E-06	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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.541E-01	0.9489
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.943E-03	0.0181
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.338E-03	0.0082
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	1.619E-03	0.0100
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	3.435E-04	0.0021
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	2.056E-03	0.0127
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	1.624E-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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	1.534E-05	0.0030	6.877E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.180E-12	0.0000
Cs-137	5.558E-04	0.1093	1.671E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.606E-09	0.0000
Pu-239	3.507E-07	0.0001	1.329E-03	0.2615	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.727E-07	0.0001
U-234	2.288E-06	0.0005	1.278E-03	0.2514	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.680E-07	0.0000
U-235	1.828E-04	0.0360	9.627E-05	0.0189	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.359E-08	0.0000
U-238	4.716E-04	0.0928	1.151E-03	0.2264	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.609E-07	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	1.228E-03	0.2416	3.854E-03	0.7582	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.017E-06	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+02 years
Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.534E-05	0.0030
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.558E-04	0.1093
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.330E-03	0.2617
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	1.281E-03	0.2519
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	2.791E-04	0.0549
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	1.622E-03	0.3192
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	5.083E-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- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	5.053E-17	0.0000	2.540E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.914E-23	0.0000
Cs-137	4.329E-06	0.0015	1.430E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.374E-11	0.0000
Pu-239	3.297E-07	0.0001	1.306E-03	0.4461	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.609E-07	0.0002
U-234	5.088E-06	0.0017	6.549E-04	0.2237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.652E-08	0.0000
U-235	8.842E-05	0.0302	6.253E-05	0.0214	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.634E-09	0.0000
U-238	2.199E-04	0.0751	5.851E-04	0.1999	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.180E-08	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	3.181E-04	0.1087	2.608E-03	0.8911	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.389E-07	0.0003

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.053E-17	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.329E-06	0.0015
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.307E-03	0.4464
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.601E-04	0.2255
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	1.510E-04	0.0516
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	8.051E-04	0.2750
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
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	2.927E-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+03 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

*Sum of all water independent and dependent pathways.

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

0Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g)									
t= 0.000E+00			1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03			
Co-60	Co-60	1.000E+00	5.710E-02	5.006E-02	3.847E-02	1.531E-02	1.101E-03	1.096E-07	3.609E-19	0.000E+00		
0Cs-137	Cs-137	1.000E+00	1.307E-02	1.276E-02	1.217E-02	1.030E-02	6.398E-03	1.208E-03	9.411E-06	0.000E+00		
0Pu-239	Pu-239	1.000E+00	5.347E-03	5.346E-03	5.345E-03	5.342E-03	5.332E-03	5.300E-03	5.207E-03	0.000E+00		
Pu-239	U-235	1.000E+00	2.326E-12	6.967E-12	1.620E-11	4.802E-11	1.348E-10	3.949E-10	8.296E-10	0.000E+00		
Pu-239	Pa-231	1.000E+00	5.806E-17	4.057E-16	2.136E-15	1.885E-14	1.529E-13	1.451E-12	8.915E-12	0.000E+00		
Pu-239	Ac-227	1.000E+00	2.521E-18	3.746E-17	4.281E-16	1.055E-14	2.114E-13	4.212E-12	3.601E-11	0.000E+00		
Pu-239	SDSR(j)		5.347E-03	5.346E-03	5.345E-03	5.342E-03	5.332E-03	5.300E-03	5.207E-03	0.000E+00		
0U-234	U-234	1.000E+00	1.643E-03	1.638E-03	1.627E-03	1.589E-03	1.486E-03	1.175E-03	6.056E-04	0.000E+00		
U-234	Th-230	1.000E+00	1.828E-08	5.476E-08	1.273E-07	3.775E-07	1.060E-06	3.116E-06	6.887E-06	0.000E+00		
U-234	Ra-226	1.000E+00	2.770E-11	1.936E-10	1.020E-09	9.005E-09	7.319E-08	6.993E-07	3.958E-06	0.000E+00		
U-234	Pb-210	1.000E+00	1.033E-15	1.536E-14	1.761E-13	4.379E-12	8.990E-11	1.896E-09	1.747E-08	0.000E+00		
U-234	Po-210	1.000E+00	1.653E-16	4.023E-15	6.679E-14	2.167E-12	4.905E-11	1.073E-09	9.972E-09	0.000E+00		
U-234	SDSR(j)		1.643E-03	1.638E-03	1.627E-03	1.589E-03	1.486E-03	1.175E-03	6.056E-04	0.000E+00		
0U-235	U-235	1.000E+00	4.721E-03	4.705E-03	4.673E-03	4.563E-03	4.265E-03	3.365E-03	1.640E-03	0.000E+00		
U-235	Pa-231	1.000E+00	1.768E-07	5.290E-07	1.227E-06	3.608E-06	9.893E-06	2.664E-05	4.468E-05	0.000E+00		
U-235	Ac-227	1.000E+00	1.022E-08	7.063E-08	3.631E-07	2.945E-06	1.908E-05	9.667E-05	2.021E-04	0.000E+00		
U-235	SDSR(j)		4.721E-03	4.705E-03	4.674E-03	4.570E-03	4.294E-03	3.488E-03	1.887E-03	0.000E+00		
0U-238	U-238	1.000E+00	2.069E-03	2.062E-03	2.048E-03	2.000E-03	1.869E-03	1.475E-03	7.314E-04	0.000E+00		
U-238	U-238	1.000E+00	2.328E-09	6.963E-09	1.614E-08	4.729E-08	1.284E-07	3.337E-07	5.069E-07	0.000E+00		
U-238	Th-230	1.000E+00	1.726E-14	1.206E-13	6.348E-13	5.590E-12	4.506E-11	4.188E-10	2.446E-09	0.000E+00		
U-238	Ra-226	1.000E+00	1.962E-17	2.938E-16	3.413E-15	8.912E-14	2.085E-12	6.386E-11	9.965E-10	0.000E+00		
U-238	Pb-210	1.000E+00	5.859E-22	1.803E-20	4.473E-19	3.306E-17	2.008E-15	1.459E-13	4.060E-12	0.000E+00		
U-238	Po-210	1.000E+00	8.113E-23	4.141E-21	1.536E-19	1.563E-17	1.076E-15	8.205E-14	2.313E-12	0.000E+00		
U-238	SDSR(j)		2.069E-03	2.062E-03	2.048E-03	2.000E-03	1.869E-03	1.475E-03	7.319E-04	0.000E+00		

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

\$ is used to indicate summations; the Greek sigma is not included in this font.

The DSR includes contributions from associated (half-life <= 30 days) daughters.

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

0Nuclide (i)	t= 0.000E+00 1.000E+00 3.000E+00 1.000E+01 3.000E+01 1.000E+02 3.000E+02 1.000E+03									
Co-60	4.378E+02	4.994E+02	6.499E+02	1.633E+03	2.272E+04	2.282E+08	*1.131E+15	*1.131E+15		
Cs-137	1.913E+03	1.959E+03	2.055E+03	2.427E+03	3.908E+03	2.069E+04	*2.656E+06	*8.701E+13		
Pu-239	4.676E+03	4.676E+03	4.677E+03	4.680E+03	4.688E+03	4.717E+03	*4.802E+03	*6.212E+10		
U-234	1.521E+04	1.526E+04	1.537E+04	1.573E+04	1.683E+04	2.128E+04	*4.128E+04	*6.245E+09		
U-235	5.296E+03	5.313E+03	5.348E+03	5.471E+03	5.823E+03	7.167E+03	*1.325E+04	*2.160E+06		
U-238	1.208E+04	1.212E+04	1.221E+04	1.250E+04	1.337E+04	1.695E+04	*3.416E+04	*3.360E+05		
*At specific activity limit										=====

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g) and Single Radionuclide Soil Guidelines G(i,t) in pCi/g									
at tmin = time of minimum single radionuclide soil guideline and at tmax = time of maximum total dose = 0.000E+00 years									
ONuclide	Initial	tmin	DSR(i,tmin)	G(i,tmin)	DSR(i,tmax)	G(i,tmax)			
(i)	(pCi/g)	(years)		(pCi/g)		(pCi/g)			
Co-60	1.400E+02	0.000E+00	5.710E-02	4.378E+02	5.710E-02	4.378E+02			
Cs-137	4.600E-01	0.000E+00	1.307E-02	1.913E+03	1.307E-02	1.913E+03			
Pu-239	2.510E-01	0.000E+00	5.347E-03	4.676E+03	5.347E-03	4.676E+03			
U-234	1.090E+00	0.000E+00	1.643E-03	1.521E+04	1.643E-03	1.521E+04			
U-235	8.000E-02	0.000E+00	4.721E-03	5.296E+03	4.721E-03	5.296E+03			
U-238	1.100E+00	0.000E+00	2.069E-03	1.208E+04	2.069E-03	1.208E+04			
=====	=====	=====	=====	=====	=====	=====			

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

ONuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr				
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01
Co-60	Co-60	1.000E+00	7.994E+00	7.008E+00	5.386E+00	2.143E+00	1.541E-01
Os-137	Cs-137	1.000E+00	6.011E-03	5.870E-03	5.597E-03	4.738E-03	2.943E-03
Pu-239	Pu-239	1.000E+00	1.342E-03	1.342E-03	1.342E-03	1.341E-03	1.338E-03
U-235	Pu-239	1.000E+00	5.838E-13	1.749E-12	4.066E-12	1.205E-11	3.383E-11
U-235	U-235	1.000E+00	3.776E-04	3.764E-04	3.738E-04	3.651E-04	3.412E-04
U-235	\$DOSE(j)		3.776E-04	3.764E-04	3.738E-04	3.651E-04	3.412E-04
Pa-231	Pu-239	1.000E+00	1.457E-17	1.018E-16	5.363E-16	4.733E-15	3.838E-14
Pa-231	U-235	1.000E+00	1.414E-08	4.232E-08	9.818E-08	2.887E-07	7.914E-07
Pa-231	\$DOSE(j)		1.414E-08	4.232E-08	9.818E-08	2.887E-07	7.914E-07
Ac-227	Pu-239	1.000E+00	6.327E-19	9.403E-18	1.075E-16	2.648E-15	5.306E-14
Ac-227	U-235	1.000E+00	8.172E-10	5.650E-09	2.905E-08	2.356E-07	1.526E-06
Ac-227	\$DOSE(j)		8.172E-10	5.650E-09	2.905E-08	2.356E-07	1.526E-06
U-234	U-234	1.000E+00	1.791E-03	1.785E-03	1.773E-03	1.732E-03	1.618E-03
U-234	U-238	1.000E+00	2.561E-09	7.659E-09	1.775E-08	5.201E-08	1.412E-07
U-234	\$DOSE(j)		1.791E-03	1.785E-03	1.773E-03	1.732E-03	1.618E-03
Th-230	U-234	1.000E+00	1.992E-08	5.968E-08	1.388E-07	4.115E-07	1.156E-06
Th-230	U-238	1.000E+00	1.899E-14	1.327E-13	6.982E-13	6.149E-12	4.957E-11
Th-230	\$DOSE(j)		1.992E-08	5.968E-08	1.388E-07	4.115E-07	1.156E-06
Ra-226	U-234	1.000E+00	3.019E-11	2.110E-10	1.111E-09	9.815E-09	7.977E-08
Ra-226	U-238	1.000E+00	2.159E-17	3.232E-16	3.754E-15	9.803E-14	2.293E-12
Ra-226	\$DOSE(j)		3.019E-11	2.110E-10	1.111E-09	9.815E-09	7.977E-08
Pb-210	U-234	1.000E+00	1.125E-15	1.675E-14	1.919E-13	4.774E-12	9.799E-11
Pb-210	U-238	1.000E+00	6.445E-22	1.984E-20	4.921E-19	3.637E-17	2.208E-15
Pb-210	\$DOSE(j)		1.125E-15	1.675E-14	1.919E-13	4.774E-12	9.799E-11
Po-210	U-234	1.000E+00	1.802E-16	4.385E-15	7.280E-14	2.362E-12	5.346E-11
Po-210	U-238	1.000E+00	8.924E-23	4.555E-21	1.690E-19	1.719E-17	1.184E-15
Po-210	\$DOSE(j)		1.802E-16	4.385E-15	7.280E-14	2.362E-12	5.346E-11
U-238	U-238	1.000E+00	2.276E-03	2.268E-03	2.253E-03	2.200E-03	2.056E-03

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

S is used to indicate summation; the Greek sigma is not included in this font.

Individual Nuclide Soil Concentration									
Parent Nuclide and Branch Fraction Indicated		S(j,t), pCi/g							
0Nuclide Parent (i)	BRF(i)	t= 0.000E+00 1.000E+00 3.000E+00 1.000E+01 2.699E+00 2.691E-04 9.941E-16 0.000E+00							
Co-60	1.000E+00	1.400E+02	1.227E+02	9.433E+01	3.754E+01	2.699E+00	2.691E-04	9.941E-16	0.000E+00
Co-60	1.000E+00	4.600E-01	4.492E-01	4.283E-01	3.626E-01	2.252E-01	4.255E-02	3.641E-04	2.111E-11
0Pu-239	1.000E+00	2.510E-01	2.510E-01	2.509E-01	2.508E-01	2.503E-01	2.488E-01	2.444E-01	2.298E-01
0U-235	1.000E+00	0.000E+00	2.468E-10	7.378E-10	2.430E-09	7.042E-09	2.087E-08	4.586E-08	6.610E-08
U-235	1.000E+00	8.000E-02	7.973E-02	7.919E-02	7.734E-02	7.227E-02	5.703E-02	2.898E-02	2.710E-03
SS(j) :		8.000E-02	7.973E-02	7.919E-02	7.734E-02	7.227E-02	5.703E-02	2.898E-02	2.710E-03
0Pa-239	1.000E+00	0.000E+00	2.610E-15	2.340E-14	2.565E-13	2.220E-12	2.156E-11	1.338E-10	4.752E-10
Pa-231	1.000E+00	0.000E+00	1.688E-06	5.034E-06	1.644E-05	4.656E-05	1.268E-04	2.142E-04	9.798E-05
Pa-231	SS(j) :	0.000E+00	1.688E-06	5.034E-06	1.644E-05	4.656E-05	1.268E-04	2.142E-04	9.798E-05
0Ac-227	1.000E+00	0.000E+00	2.745E-17	7.253E-16	2.494E-14	5.515E-13	1.137E-11	9.862E-11	3.947E-10
Ac-227	1.000E+00	0.000E+00	2.656E-08	2.322E-07	2.338E-06	1.615E-05	8.363E-05	1.769E-04	8.676E-05
Ac-227	SS(j) :	0.000E+00	2.656E-08	2.322E-07	2.338E-06	1.615E-05	8.363E-05	1.769E-04	8.676E-05
0U-234	1.000E+00	1.090E+00	1.086E+00	1.079E+00	1.054E+00	9.847E-01	7.768E-01	3.945E-01	3.682E-02
U-234	1.000E+00	0.000E+00	3.108E-06	9.261E-06	3.015E-05	8.452E-05	2.223E-04	3.387E-04	1.055E-04
U-234	SS(j) :	1.090E+00	1.086E+00	1.079E+00	1.054E+00	9.847E-01	7.770E-01	3.948E-01	3.692E-02
0Th-230	1.000E+00	0.000E+00	9.795E-06	2.929E-05	9.647E-05	2.799E-04	8.318E-04	1.845E-03	2.776E-03
Th-230	1.000E+00	0.000E+00	1.400E-11	1.255E-10	1.372E-09	1.181E-08	1.123E-07	6.603E-07	2.072E-06
Th-230	SS(j) :	0.000E+00	9.795E-06	2.929E-05	9.647E-05	2.799E-04	8.318E-04	1.845E-03	2.776E-03
0Ra-226	1.000E+00	0.000E+00	2.121E-09	1.902E-08	2.087E-07	1.810E-06	1.772E-05	1.125E-04	4.318E-04
Ra-226	1.000E+00	0.000E+00	2.022E-15	5.436E-14	1.982E-12	5.120E-11	1.625E-09	2.854E-08	2.691E-07
Ra-226	SS(j) :	0.000E+00	2.121E-09	1.902E-08	2.087E-07	1.810E-06	1.772E-05	1.125E-04	4.321E-04
0Pb-210	1.000E+00	0.000E+00	2.181E-11	5.780E-10	2.007E-08	4.545E-07	9.920E-06	9.218E-05	4.070E-04
Pb-210	1.000E+00	0.000E+00	1.562E-17	1.245E-15	1.452E-13	1.007E-11	7.661E-10	2.158E-08	2.492E-07
Pb-210	SS(j) :	0.000E+00	2.181E-11	5.780E-10	2.007E-08	4.546E-07	9.921E-06	9.220E-05	4.072E-04
0Po-210	1.000E+00	0.000E+00	7.202E-12	3.561E-10	1.710E-08	4.299E-07	9.733E-06	9.131E-05	4.043E-04
Po-210	1.000E+00	0.000E+00	4.340E-18	6.849E-16	1.179E-13	9.354E-12	7.475E-10	2.135E-08	2.475E-07
Po-210	SS(j) :	0.000E+00	7.202E-12	3.561E-10	1.710E-08	4.299E-07	9.734E-06	9.133E-05	4.045E-04
0U-238	1.000E+00	1.100E+00	1.096E+00	1.089E+00	1.063E+00	9.938E-01	7.841E-01	3.984E-01	3.726E-02
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====

BRF(i) is the branch fraction of the parent nuclide.
S is used to indicate summation; the Greek sigma is not included in this font.
ORESALC.EXE execution time = 2.43 seconds

Appendix J

**Closure Recommendation for
CAS 04-26-03**

LEO DROZDOFF, *Administrator*

(775) 687-4670

Administration
Facsimile 687-5836

Water Quality Planning
Water Pollution Control
Facsimile 687-4684

Mining Regulations and Reclamation
Facsimile 684-5259

STATE OF NEVADA
KENNY C. GUINN
Governor

ALLEN BIAGGI, *Director*

Air Pollution Control
Air Quality Planning
Facsimile 687-6396

Waste Management
Facsimile 687-6396

Corrective Actions
Facsimile 687-8335

ndep.nv.gov

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL PROTECTION

Las Vegas Office
1771 East Flamingo Road, Suite 121-A
Las Vegas, Nevada 89119-0837

February 28, 2005

Ms. Janet L. Appenzeller-Wing
Acting Director, Environmental Restoration Division
National Nuclear Security Administration
Nevada Site Office
P. O. Box 98518
Las Vegas, NV 89193-8518

RE: Approval of Closure Recommendation for Streamlined Approach for Environmental
Restoration Work Plan, Corrective Action Unit 357, Mud Pits and Waste Dump
Federal Facility Agreement and Consent Order

The Nevada Division of Environmental Protection, Bureau of Federal Facilities (NDEP) staff has reviewed the closure recommendation for Corrective Action Site (CAS) 04-26-03, Lead Bricks, which is part of the Streamlined Approach for Environmental Restoration (SAFER) Work Plan for Corrective Action Unit (CAU) 357, Mud Pits and Waste Dump. The closure recommendation is hereby approved without comments pursuant to Subpart XII.8.a of the Federal Facility Agreement and Consent Order (FFACO).

The SAFER Work Plan was not found to be Substantially Deficient pursuant to Subpart VIII.3.b of the FFACO and was received in a timely manner. Therefore, this letter serves as the Notice of Completion for this milestone pursuant to Subpart XXV.1 of the FFACO.

NDEP recognizes that as characterization/field work proceeds, a change in the scope of the investigation may be required or justified based on information developed in the course of the ongoing work. Propose any changes to the scope of work approved in the SAFER Work Plan to NDEP as soon as possible.

Janet L. Appenzeller-Wing
February 28, 2005
Page 2

Address any questions regarding this matter to Don Elle at (702) 486-2874.

Tim Murphy
Chief
Bureau of Federal Facilities

THM/DRE/JJM/jjm

CC: Ken Hoar, Director, ES&HD, NNSA/NSO
Eric Shanholtz, DTRA/DTNS
Patti Hall, EM, NNSA/NSO
Frank Di Sanza, WMD, NNSA/NSO
Sabine Curtis, ERD, NNSA/NSO
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Tiffany Lantow, DTRA/TDTN

Department of Energy
National Nuclear Security Administration
Nevada Site Office
P.O. Box 98518
Las Vegas, NV 89193-8518

JAN 12 2005

Tim Murphy, Chief
Bureau of Federal Facilities
Division of Environmental Protection
1771 E. Flamingo, Suite 121A
Las Vegas, NV 89119

TRANSMITTAL OF CLOSURE RECOMMENDATION FOR CORRECTIVE ACTION UNIT
357: MUD PITS AND WASTE DUMPS, NEVADA TEST SITE, NEVADA, REVISION 0,
JUNE 2003

Please find enclosed the closure recommendation for Corrective Action Site 04-26-03, Lead
Bricks, for your review and approval.

Please direct comments and questions to Sabine T. Curtis, of my staff, at (702) 295-0542.

Janet L. Appenzeller-Wing, Acting Director
Environmental Restoration Division

ERD:STC-1230

Enclosure:
As stated

cc w/encl:
D. R. Elle, NDEP, Las Vegas, NV
S. K. Doty, EM Records Center,
NNSA/NSO, Las Vegas, NV

CAU 356, CAS 04-26-03, Lead Bricks
January 5, 2004

Corrective Action Site (CAS) 04-26-03 is located in Area 4, north of 4-04 Road and west of the BEEF Facility and is one of the 14 CASs included in the CAU 357 SAFER. The area of investigation is approximately 3.428 acres (149,345 sq ft) located within a radioactive materials area (RMA), and consisted of lead brick debris. Based on the 2003 SAFER Plan, the configuration of the scattered lead bricks within the area was to be determined and locations in contact with the bricks would be sampled and analyzed for lead. In addition, one shovel of soil would be removed from below each brick or cluster of bricks. Sample collection would be biased and correlated to clusters of lead bricks. Site closure alternatives for CAS 04-26-03 are clean closure and closure in place with administrative controls.

The initial scope planned for CAS 04-26-03 was the removal of approximately 50 lead bricks identified to be visible on the surface during the preliminary assessment (PA) and initial site visits. After the one shovel of soil was removed and appropriately disposed, confirmatory soil sampling beneath the bricks was proposed to allow for clean closure of the CAS. However, during the initial phase of fieldwork an increased number of bricks were identified to be present just below the surface that were not visible during the planning stage of the project. Subsequent geophysical investigations also revealed that the bricks were clustered in a "high-density area" and single bricks were spread out beyond the estimated CAS boundary presented in the SAFER Plan. To complete the investigation approximately 1,000 bricks or pieces of bricks were collected and contained in two B25 boxes. Lead contaminated soil was excavated from beneath the removed bricks or clusters of bricks and contained in three B25 boxes.

Figure 1 (attached) shows the distribution of lead bricks throughout the investigation area and the area having the high-density of bricks. To ensure that the bricks were removed and there were no bricks remaining at deeper depths, additional geophysical surveys were conducted as the removal process progressed. Subsequent to the removal of the lead bricks, 114 confirmatory soil samples were collected from 84 shallow excavations beneath the brick locations. The majority of samples were collected beneath brick locations. However, some samples locations were biased within clusters of bricks. Nineteen surface samples were collected within the area of investigation; seven were collected from locations within an area that had the highest density of bricks (high density area).

Figure 2 (attached) shows the remaining concentration of lead in soil and demonstrates that the concentrations exceeding the PAL of 750 mg/kg are limited to the high-density (shown in blue). All sample locations outside the high-density area have lead concentrations below PALs. Analytical results from two sample locations within the high-density area indicate lead concentrations above the PALs.

Initial surface soil data from 6 sample locations (M15, M16, M17, M85, M86, and M87) within the high-density area suggests that lead contamination is not limited to directly below brick locations. Analytical data obtained from these surface locations indicated concentrations of lead in soil ranging from 3,200 to 19,000 mg/kg. The data indicates that lead is distributed in surface soil within this high-density area. The soils at these locations have been removed and subsequent soil samples collected. Table 1 (attached) provides analytical data including the depth of sample collection and current disposition of soil at the sample locations. In all but four samples, the data indicate a decrease in lead concentration with depth. Currently, two sample locations (M15 and M86) have lead remaining in soil above the PAL at concentrations of 3,100 and 4,300 mg/kg, respectively.

To represent concentrations of lead in soil in the high-density area a statistical analysis of the data was used. A Shapiro-Wilk statistic was performed to determine the distribution of the data set and a 95% upper confidence level (UCL) of the arithmetic mean was calculated. The UCL was calculated at 14,600 mg/kg. This is a conservative estimate of average concentrations of lead in soil. Data to support the UCL is presented in an attachment.

Under the SAFER Plan the two alternatives considered were clean closure or close in place with use restrictions. The recommended closure alternative is closure in place with administrative controls for the boundaries of the high-density area. Currently, this is based on the point-by-point comparison to the accepted PAL of 750 mg/kg for lead in soil. PALs for CAU 357 are based on the USEPA Region 9 Preliminary Remediation Goals (PRGs). NNSA/NSO established the PALs based on NAC 445A.2272 and uses them as action levels for site screening purposes. However, the PALs are not intended to be used as remediation standards FALs (as defined in NAC 445A.22675). The process for moving from PALs to FALs is based on the stipulation in NAC 445A.22705 and uses the ASTM Method E 1739-95 to conduct an evaluation of the site, based on the risk it poses to public health and the environment. Under the PAL to final action level (FAL) process, the acceptable concentrations to

be left in place would be based on the reuse scenario of occasional use rather than the standard industrial reuse of 8 hr/day for 250 days/yr for a 25 year career. Results of this risk-based evaluation can be used to determine the necessary closure alternative. The following is the basis for the FAL calculation:

- Based on the future land use as identified in DOE/NV-525, *Nevada Test Site Resource Management Plan*, 1998, activities on the test site have been categorized into three types: 1) Industrial Area, which assumes that industrial workers are assigned to the work area and are exposed to contaminants in soil on a daily basis; 2) Remote Work Area, which assumes that industrial workers are not assigned to a specific work area but may regularly visit the work area; and 3) Occasional Use, which assumes that industrial workers visit the site occasionally for short-term activities. Corrective Action Site 04-26-03 is located in an area where there are no active improvements and the future land use designation is for outdoor tests. This occasional use scenario assumes that a site worker is on the site for 8 hours per day, 10 days per year, for 5 years. The potential exposure scenario is inhalation of particulates and/or incidental ingestion.
- The Users' Guide and Background Technical Document for USEPA Region 9's PRG Table identifies the Adult Lead Model (ALM) as the methodology used to derive the PRG for lead in an industrial setting. This methodology is documented in Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil [EPA-540-R-03-001, OSWER Dir #9285.7-54] December 1996 (January 2003) found at the <http://www.epa.gov/superfund/programs/lead/products.htm> website.
- The ALM methodology focuses on estimating fetal blood lead concentration in pregnant females exposed to lead-contaminated soils. This method of calculating the lead PRG is intended to protect an unborn fetus that may be carried by a pregnant female worker. It is assumed that a cleanup goal that is protective of a fetus will also afford protection for adult male or female workers. The model equations were developed to calculate cleanup goals such that there would be no more than a 5% probability that fetuses exposed to lead would exceed a blood lead level of 10 µg/dL of blood.
- Table 2 shows the calculation of acceptable lead concentrations in soil. Based on the occasional use scenario and assuming heterogeneity of the contamination distribution (demonstrated by the analytical results), the calculated final action level would be 17,079-mg/kg lead in soil.

Using the PAL to FAL process, the risk-based calculation for acceptable concentrations of lead in soil left in place is 17,079 mg/kg. The conservative estimate for concentrations of lead in soil within the high-density area at CAS 04-26-03 is 14,600mg/kg. A use restriction that will prevent unnecessary

access to this area is recommended to enforce the occasional use scenario and provide protection from potential changes to future land use.

Table 2. Input Parameters for the Calculation of Acceptable Lead Concentrations in Soil that will not Exceed the 10 Ug/dl Blood Lead Level.								
Exposure Variable	PRG Equation ¹		Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario			
	1*	2**			Using Equation 1		Using Equation 2	
					GSDi = Hom	GSDi = Het	GSDi = Hom	GSDi = Het
PbB _{fetal, 0.95}	X	X	95 th percentile PbB in fetus	ug/dL	10	10	10	10
R _{fetal/maternal}	X	X	Fetal/maternal PbB ratio	--	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
GSD _i	X	X	Geometric standard deviation PbB	--	2.1	2.3	2.1	2.3
PbB ₀	X	X	Baseline PbB	ug/dL	1.5	1.7	1.5	1.7
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
W _s		X	Weighting factor; fraction of IR _{s+D} ingested as outdoor soil	--	--	--	1.0	1.0
K _{SD}		X	Mass fraction of soil in dust	--	--	--	0.7	0.7
AF _{s, D}	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
EF _{s, D}	X	X	Exposure frequency (same for soil and dust)	days/yr	10	10	10	10
AT _{s, D}	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PRG	Preliminary Remediation Goal			ppm	27,052	17,079	27,052	17,079

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.

*Equation 1, based on Eq. 4 in USEPA (1996).

$$\text{PRG} = \frac{([\text{PbB}_{95\text{fetal}}/(\text{R}^*(\text{GSD}_i^{1.645}))]-\text{PbB}_0)*\text{AT}_{\text{S,D}}}{\text{BKSF}*(\text{IR}_{\text{S+D}}*\text{AF}_{\text{S,D}}*\text{EF}_{\text{S,D}})}$$

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

$$\text{PRG} = \frac{([\text{PbB}_{\text{fetal},0.95}/(\text{R}^*(\text{GSD}_i^{1.645}))]-\text{PbB}_0)*\text{AT}_{\text{S,D}}}{\text{BKSF}*([\text{IR}_{\text{S+D}}]*\text{AF}_{\text{S}}*\text{EF}_{\text{S}}*\text{W}_{\text{S}}]+[\text{K}_{\text{SD}}*(\text{IR}_{\text{S+D}})*(1-\text{W}_{\text{S}})*\text{AF}_{\text{D}}*\text{EF}_{\text{D}}])}$$

CAU 357
CAS 04-26-03, Lead Sample Analytical Results
(Page 1 of 5)

Sample Location	Sample ID Identification	Sample Date	Sample Depth (Inches)	Results (mg/kg)	Current Soil Disposition
M01	357M001	8/18/2004	4 to 6-inches	510/290	Remaining
M02	357M003	8/18/2004	4 to 6-inches	620	Remaining
M03	357M004	8/18/2004	4 to 6-inches	17000	Removed
	357M010	10/18/2004	6 to 8-inches	3500	Removed
	357M064	11/1/2004	12 to 14-inches	2700	Removed
	357M067	11/1/2004	14 to 16-inches	1100	Removed
	357M101	12/1/2004	22 to 24-inches	250	Remaining
M04	357M005	8/18/2004	4 to 6-inches	1700	Removed
	357M034	10/25/2004	5 to 7-inches	82	Removed
	357M061	11/1/2004	6 to 8-inches	86	Remaining
M05	357M006	8/18/2004	4 to 6-inches	5300	Removed
	357M062	11/1/2004	6 to 8-inches	310	Removed
	357M063	11/1/2004	12 to 14-inches	1200	Removed
	357M102	12/1/2004	18 to 20-inches	63	Remaining
M06	357M007	8/19/2004	4 to 6-inches	4500	Removed
	357M018	10/18/2004	6 to 8-inches	1300	Removed
	357M103	12/1/2004	12 to 14-inches	310	Remaining
M07	357M008	8/19/2004	4 to 6-inches	150	Remaining
M08	357M009	8/19/2004	4 to 6-inches	130	Remaining
M11	357M011	10/18/2004	6 to 8-inches	950	Removed
	357M105	12/1/2004	14 to 16-inches	95	Remaining
M12	357M012	10/18/2004	4 to 6-inches	12000	Removed
	357M013	10/18/2004	6 to 8-inches	5000	Removed
	357M109	12/2/2004	18 to 20-inches	270	Remaining
M13	357M014	10/18/2004	4 to 6-inches	3700	Removed
	357M015	10/18/2004	6 to 8-inches	220	Remaining

CAU 357
CAS 04-26-03, Lead Sample Analytical Results
(Page 2 of 5)

Sample Location	Sample ID Identification	Sample Date	Sample Depth (Inches)	Results (Mg/kg)	Current Soil Disposition
M14	357M016	10/18/2004	4 to 6-inches	220	Removed
	357M017	10/18/2004	6 to 8-inches	640	Remaining
M15	357M019	10/18/2004	Surface	9700	Removed
	357M108	12/2/2004	6 to 8-inches	760	Removed
	357M110	12/2/2004	14 to 16-inches	4300	Remaining
M16	357M020	10/18/2004	Surface	14000	Removed
	357M065	11/1/2004	6 to 8-inches	100	Removed
	357M066	11/1/2004	12 to 14-inches	2400	Removed
	357M111	12/2/2004	22 to 24-inches	21	Remaining
M17	357M021	10/18/2004	Surface	3200	Removed
	357M112	12/2/2004	6 to 8-inches	430	Removed
	357M113	12/2/2004	14 to 16-inches	120	Remaining
M18	357M022	10/25/2004	4 to 6-inches	11	Remaining
M19	357M023	10/25/2004	4 to 6-inches	160/260	Remaining
M20	357M025	10/25/2004	4 to 6-inches	180	Remaining
M21	357M026	10/25/2004	4 to 6-inches	110	Remaining
M22	357M027	10/25/2004	4 to 6-inches	26	Remaining
M23	357M028	10/25/2004	4 to 6-inches	23	Remaining
M24	357M029	10/25/2004	4 to 6-inches	34	Remaining
M25	357M030	10/25/2004	4 to 6-inches	41	Remaining
M26	357M031	10/25/2004	4 to 6-inches	31	Remaining
M27	357M032	10/25/2004	5 to 7-inches	190	Remaining
M28	357M033	10/25/2004	5 to 7-inches	120	Remaining
M29	357M035	10/25/2004	4 to 6-inches	250	Remaining
M30	357M036	10/25/2004	4 to 6-inches	16	Remaining
M31	357M037	10/26/2004	4 to 6-inches	150	Remaining
M32	357M038	10/26/2004	5 to 7-inches	700	Remaining
M33	357M039	10/26/2004	5 to 7-inches	54/53	Remaining

CAU 357
CAS 04-26-03, Lead Sample Analytical Results
(Page 3 of 5)

Sample Location	Sample ID Identification	Sample Date	Sample Depth (Inches)	Results (Mg/kg)	Current Soil Disposition
M34	357M041	10/26/2004	4 to 6-inches	42	Remaining
M35	357M042	10/26/2004	5 to 7-inches	460	Remaining
M36	357M043	10/26/2004	5 to 7-inches	650	Remaining
M37	357M044	10/26/2004	4 to 6-inches	96	Remaining
M38	357M045	10/26/2004	4 to 6-inches	99	Remaining
M39	357M046	10/26/2004	4 to 6-inches	16	Remaining
M40	357M047	10/26/2004	4 to 6-inches	15	Remaining
M41	357M048	11/1/2004	Surface	44	Remaining
M42	357M049	11/1/2004	Surface	42	Remaining
M43	357M050	11/1/2004	Surface	19/23	Remaining
M44	357M052	11/1/2004	Surface	31	Remaining
M45	357M053	11/1/2004	Surface	160	Remaining
M46	357M054	11/1/2004	Surface	150	Remaining
M47	357M055	11/1/2004	Surface	39	Remaining
M48	357M056	11/1/2004	Surface	48	Remaining
M49	357M057	11/1/2004	Surface	110	Remaining
M50	357M058	11/1/2004	Surface	97	Remaining
M51	357M059	11/1/2004	Surface	470	Remaining
M52	357M060	11/1/2004	Surface	49	Remaining
M53	357M068	11/2/2004	4 to 6-inches	35	Remaining
M54	357M069	11/2/2004	5 to 7-inches	22	Remaining
M55	357M070	11/2/2004	4 to 6-inches	42/48	Remaining
M56	357M072	11/2/2004	4 to 6-inches	17	Remaining
M57	357M073	11/2/2004	5 to 7-inches	24	Remaining
M58	357M074	11/2/2004	6 to 8-inches	44	Remaining
M59	357M075	11/2/2004	6 to 8-inches	83	Remaining
M60	357M076	11/2/2004	5 to 7-inches	12	Remaining
M61	357M077	11/2/2004	5 to 7-inches	29	Remaining

CAU 357
CAS 04-26-03, Lead Sample Analytical Results
(Page 4 of 5)

Sample Location	Sample ID Identification	Sample Date	Sample Depth (Inches)	Results (Mg/kg)	Current Soil Disposition
M62	357M078	11/2/2004	4 to 6-inches	59	Remaining
M63	357M079	11/2/2004	5 to 7-inches	17	Remaining
M64	357M080	11/2/2004	4 to 6-inches	23	Remaining
M65	357M081	11/4/2004	6 to 8-inches	230	Remaining
M66	357M082	11/4/2004	5 to 7-inches	17	Remaining
M67	357M083	11/4/2004	6 to 8-inches	70	Remaining
M68	357M084	11/4/2004	5 to 7-inches	16	Remaining
M69	357M085	11/4/2004	5 to 7-inches	14	Remaining
M70	357M086	11/4/2004	4 to 6-inches	16/25	Remaining
M71	357M088	11/4/2004	6 to 8-inches	150	Remaining
M72	357M089	11/4/2004	4 to 6-inches	45	Remaining
M73	357M090	11/5/2004	5 to 7-inches	51	Remaining
M74	357M091	11/5/2004	6 to 8-inches	4400	Removed
	357M106	12/2/2004	14 to 16-inches	69	Remaining
M75	357M092	11/5/2004	5 to 7-inches	150	Remaining
M76	357M093	11/5/2004	6 to 8-inches	3000	Removed
	357M107	12/2/2004	14 to 16-inches	350	Remaining
M77	357M094	11/5/2004	6 to 8-inches	20	Remaining
M78	357M095	11/5/2004	6 to 8-inches	130	Remaining
M79	357M096	11/5/2004	6 to 8-inches	24	Remaining
M80	357M097	11/5/2004	5 to 7-inches	38	Remaining
M81	357M098	11/5/2004	5 to 7-inches	34	Remaining
M82	357M099	11/5/2004	6 to 8-inches	33	Remaining
M83	357M100	11/5/2004	5 to 7-inches	21	Remaining
M84	357M114	12/2/2004	Surface	91	Removed
	357M115	12/2/2004	6 to 8-inches	430	Remaining
M85	357M116	12/2/2004	Surface	19000	Removed
	357M117	12/2/2004	6 to 8-inches	270	Remaining

CAU 357
CAS 04-26-03, Lead Sample Analytical Results
(Page 5 of 5)

Sample Location	Sample Identification	Sample Date	Sample Depth (Inches)	Results (Mg/kg)	Current Soil Disposition
M86	357M118	12/2/2004	Surface	9700	Removed
	357M119	12/2/2004	6 to 8-inches	3100	Remaining
M87	357M120	12/2/2004	Surface	4700	Removed
	357M121	12/2/2004	8 to 10-inches	630	Remaining

Notes:
mg/kg = Milligrams per kilogram

Statistical Analysis for CAU 357 Pb Data

There are a number of methods to determine the distribution of a data set (EPA, 1992). The method selected in this case is the Shapiro-Wilk test for normality. Using the Shapiro-Wilk statistic, the null hypothesis is that the data distribution is normal (or lognormal in the case of log-transformed data). A “P” value less than or equal to 0.05 (95% confidence) is used to reject the null hypothesis, that is, the data are not normally (or lognormally) distributed. In the case where data fits both a normal and lognormal distribution, the highest P value represents the best fit and the appropriate (normal or lognormal) distribution for the data.

For these data, a Shapiro-Wilk statistic was performed. The common parametric UCL formula based on the Student’s t-distribution is used for normally distributed data (UCL_N , Rice 1994). When calculated, the probability values of less than 0.05 indicated that the data were not normally distributed.

The data were then log-transformed and the Shapiro-Wilk statistic was recalculated to test for lognormality. Land’s parametric method (Gilbert 1987 and EPA 1992) for the UCL of the arithmetic mean is used for lognormally distributed data. The UCL of the arithmetic mean is the statistic of interest, and therefore, is “unbiased” relative to the UCL computed from simple log transformation of the data. Again, when calculated, the probability values were greater than 0.05, therefore, the data were considered lognormal.

For data sets that are neither normally nor lognormally distributed, the nonparametric “bootstrap” algorithm (Efron and Tibshirani 1993; and Burmaster and Thompson 1997) is used to approximate the UCL of the mean.

References:

- Burmaster, E.E., and K.M. Thompson. 1997. Estimating Exposure Point Concentrations for Surface Soils for use in Deterministic and Probabilistic Risk Assessments. *Human Ecological Risk Assessment*, Vol. 3, No. 3, pp. 363-684.
- Efron, B., and R.J. Tibshirani. 1993. *An Introduction to the Bootstrap*. Monographs on Statistics and Applied Probability, 57, Chapman & Hall, London, England.

EPA. 1992. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities. Addendum to Interim Final Guidance. Prepared by the Office of Solid Waste, Washington, DC

Gilbert, R.O., 1987. Statistical Methods for Environmental Pollution Monitoring. Van Nostrand Reinhold, New York.

Rice, J.A. 1994. Mathematical Statistics and Data Analysis. Duxbury Press, Belmont, California.

SiteID	Analyte	Sample Size	% N D	Shapiro Wilkes Statistic for Normality	Shapiro Wilkes P Value for Normality	Normally Distributed ?	Shapiro Wilkes Statistic for Lognormality	Shapiro Wilkes P Value for Lognormality	Lognormally Distributed ?
CAU357	PB	35	0	0.719	7.33E-07	No	0.97	0.436	Yes

Site	CAU357
Analyte	PB
Units	mg/kg
n	35
Number Detected	35
% NonDetects	0
Min	21
Max	19000
Mean	3620
Median	1100
StdDev	5080
MAD	1490
CV	1.4
UCL normal	5070
UCL lognormal	14600
UCL nonparametric	5160

CAU357 SUB B PB NORMAL

Histogram

Boxplot

Summary Statistics

chemical: PB	
units: mg/kg	
sample size = 35	mean = 3620
no. detects = 35	median = 1100
% non-detects = 0	stdev = 5080
SQL range = NA - NA	MAD = 1490
min = 21	CV = 1.4
max = 19000	

Q-Q Plot

CAU357 SUB B PB LOGNORMAL

Histogram

Boxplot

Density Estimation

Q-Q Plot

Appendix K

Nevada Division of Environmental Protection Document Review Sheets

NEVADA ENVIRONMENTAL RESTORATION PROJECT DOCUMENT REVIEW SHEET

1. Document Title/Number <u>Draft Closure Report for Corrective Action Unit 357: Mud Pits and Waste Dump, Nevada Test Site, Nevada</u>		2. Document Date <u>March 2005</u>	
3. Revision Number <u>0</u>		4. Originator/Organization <u>Stoller-Navarro</u>	
5. Responsible DOE/NV ERP Project Mgr. <u>Janet Appenzeller-Wing</u>		6. Date Comments Due <u>March 28, 2005</u>	
7. Review Criteria <u>Full</u>			
8. Reviewer/Organization/Phone No. <u>Jeff MacDougall, NDEP, 486-2865</u> 9. Reviewer's Signature _____			

10. Comment Number/ Location	11. Type ^a	12. Comment	13. Comment Response	14. Accept
1) Section 1.1 Page 3 2 nd Paragraph 3 rd Line		Replace 'are' with 'is' in "A brief description of the CAU and associated CASSs is provided..."	The change has been incorporated as requested	Yes
2) Section 1.1.8 Page 5 2 nd Paragraph 4 th Line		Correct "Pindrops-Sloat" to Pinedrops-Sloat".	The change has been incorporated as requested	Yes
3) Section 2.0 Page 11 2 nd Paragraph 4 th Line		Replace 'from' with 'on' in "The need for statistical methods is dependent on..."	The change has been incorporated as requested	Yes
4) Section 2.1.2 Page 14 1 st Paragraph 5 th Line		The word 'location' should be plural as in "Drilling mud was observed at all sample locations except..."	The change has been incorporated as requested	Yes
5) Section 4.0 Page 57 3 rd Paragraph 10 th Line		The phrase "(less than 1 cubic foot)" should read "(less than 1 cubic yard)".	The change has been incorporated as requested	Yes

^a Comment Types: M = Mandatory, S = Suggested.
Return Document Review Sheets to DOE/NV Environmental Restoration Division, Attn: QAC, M/S 505.

NEVADA ENVIRONMENTAL RESTORATION PROJECT DOCUMENT REVIEW SHEET

Document Title/Number Draft Closure Report for Corrective Action Unit 357: Mud Pits and Revision Number 0
Waste Dump, Nevada Test Site, Nevada
 Reviewer/Organization Jeff MacDougall, NDEP, 486-2865

10. Comment Number/ Location	11. Type ^a	12. Comment	13. Comment Response	14. Accept
6) Section 4.0 Page 63 4 th Paragraph 9 th Line		The EPA Region IX PRG for lead is currently 800 mg/kg, as of the latest version dated October 2004.	This change was not incorporated into the text because the SAFER Plan for CAU 357 stipulated the use of the 2002 EPA Region IX risk-based PRGs for industrial soils as the preliminary action levels. The seventh sentence has been modified to read as follows: "...750 mg/kg that is based on the EPA Region 9 PRGs established in 2002. The more current PRG for lead established in October 2004 is 800 mg/kg. The current PRG was not used because the SAFER Plan stipulated the use of the 2002 PRGs. The samples that detected concentrations above the screening PALs are located within the 'high-density area.'"	Yes
7) Appendix D Tables		In the November 19, 2004 letter from Murphy to Bangerter, NDEP agreed to an annual dose limit of 100 mrem/yr and an annual dose constraint of 25 mrem/yr for NTS Industrial Sites. In light of this, scaling screening limits to 15 mrem/yr is no longer applicable.	This change was not incorporated into the text because ROTC No. 1 of the SAFER Plan for CAU 357 stipulated that the radiological isotope screening limits, established using the 15 mrem/yr limit, be used as the preliminary action levels. The data has been evaluated using the 25 mrem/yr screening limit and does not change the closure recommendations provided herein. The use of the 25 mrem/yr screening limit will be incorporated into future FFACO documents as stipulated by NDEP.	No

^a Comment Types: M = Mandatory, S = Suggested.
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NEVADA ENVIRONMENTAL RESTORATION PROJECT DOCUMENT REVIEW SHEET

Document Title/Number Draft Closure Report for Corrective Action Unit 357: Mud Pits and Revision Number 0
Waste Dump, Nevada Test Site, Nevada

Reviewer/Organization Jeff MacDougall, NDEP, 486-2865

10. Comment Number/ Location	11. Type ^a	12. Comment	13. Comment Response	14. Accept
8) Appendix I Pages 14, 38, 62		The default RESRAD Dose Conversion Factors (DCFs) are incorrectly stated to be "FGR 13 morbidity values". The slope factors are from FGR 13. Default DCFs are from FGR 11. NDEP has not agreed to use the FGR 13 values for DCFs. Please verify that the proper values have been used.	The default FGR 11 DCFs were used in the RESRAD calculations. The text in the identified sections of Appendix I have been modified as follows: "The dose conversion factors used for inhalation and ingestion were the default FGR 11 values. The FGR 13 morbidity values were used for the risk slope factor and correspond to the guidance and recommendations per the memorandum from A. Lawrence Office of Environmental Policy & Guidance, to Distribution, titled <i>Radiation Risk Estimation from Total Effective Dose Equivalents (TEDEs)</i> (EH-412-2002-1, August 9, 2002)."	Yes
9) Appendix I		NDEP requests that actual printout results from RESRAD runs be included for each scenario listed in this appendix.	The RESRAD runs for each scenario have been incorporated as requested	Yes

^a Comment Types: M = Mandatory, S = Suggested.
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