ADMINISTRATIVE DOCUMENT PROCESSING AND APPROVAL

Document Title:	Owning Organization/Facility:
Total Effective Dose Equivalent Calculation for D4 of the 324 Facility	324
Document Number: ECF-324 BLDG-17-0086	Revision/Change Number: 1

Document Type: *(check one)* ☐ Plan ☐ Report ☐ Study ☐ Description Document ☒ Other

Document Action: *(check one)* ☐ New ☒ Revision ☐ Cancellation

RESPONSIBLE CONTACTS:

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DOCUMENT CONTROL:	Yes	No
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Document Revision Summary:

NOTE: Provide a brief description of summary of the changes for the document listed

A summary of items revised in this revision include:
- Updates to 324 Facility D4 approach
  * Remediation of the 300-296 will not be performed from within the B Cell
  * 300-296 UPR waste site soil will not be placed within the REC cells
  *Saw cuts and monolith removal of the REC cells
- Updates to the meteorology used in CAP88 to current wind data from 2015 to 2023.
- Updates to the map of hypothetical maximally exposed individuals (MEIs), given the changes in the DOE Hanford Site boundary, DOE leased land, and DOE land transfers
- Radiological decay waste inventories to current day
- Updates to the 324 Facility D4 schedule.
- Updates to the point source and fugitive source CAP88 runs to reflect updated PTE values (Attachment C, D, E, and F).
- Updates to the calculation to reflect which activities that will be performed while the stack is operational (point source emissions) and those that will be performed after the stack is not operational (fugitive source emissions).
- Updates to the radiological inventories based on most recent data and characterization
- Updates to the PTE estimates based on new D4 plan
- Updates to the PTE estimates for saw cutting based on new D4 plan
- Updates to the calculation to reflect that final grouting of some areas will be performed during the fugitive source phase instead of the point source phase of the project.

REVIEWERS:

Name *(print first and last)*	Organization
Rick Reeder	324 Radiological Control
Steve Marske	324 Engineering
Mitch Marrott	CPC Co Environmental Air Support
Karen Price	Senior Engineer
Nate Clark	Mechanical Engineer
Stacey Cutter	324 Environmental

ADMINISTRATIVE DOCUMENT PROCESSING AND APPROVAL (Continued)

Author:		RELEASE/ISSUE
Tom Rodovsky *Print First and Last Name*	Rodovsky, Tom J Digitally signed by Rodovsky, Tom J Date: 2025.06.15 20:00:14 -07'00' *Signature / Date*	DATE: Jun 25, 2025 HANFORD RELEASE
Responsible Manager:		
Brent Porter *Print First and Last Name*	Porter, Brenton R Digitally signed by Porter, Brenton R Date: 2025.06.16 06:28:52 -07'00' *Signature / Date*	
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06/18/2025

INFORMATION CLEARANCE FORM

A. Information Category

- [ ] Abstract
- [ ] Summary
- [ ] Visual Aid
- [ ] Full Paper
- [ ] Journal Article
- [ ] Internet
- [ ] Software
- [ ] Report
- [ ] Other

B. Document Number: ECF-324 BLDG-17-0086 Revision 1

C. Title: Total Effective Dose Equivalent Calculation for D4 of the 324 Facility

D. Proposed Internet Address

E. Required Information (MANDATORY)

1. Is document potentially Classified? (•) No ( ) Yes

Porter, Brent Approved via att. IDMS data file.
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If Yes _____
ADC Required (Print and Sign) ( ) No ( ) Yes Classified

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Responsible Manager

Porter, Brent Approved via att. IDMS data file.
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Approval by Direct Report to President (Speech/Articles Only) _____
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Office of External Affairs	[X]	McKenna, Mark	Approved via att. IDMS data file.	(Y) / N
DOE	[ ]			Y / N
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Other	[ ]			Y / N
Other	[ ]			Y / N

J. Comments

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APPROVED
By Julia Killinger at 7:53 am, Jun 25, 2025

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ECF-324 BLDG-17-0086
Revision 1

Total Effective Dose Equivalent Calculation for D4 of the 324 Facility

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract 89303320DEM000030

P.O. Box 1464
Richland, Washington 99352

Total Effective Dose Equivalent Calculation for D4 of the 324 Facility

Document Type: ECF Program/Project: 324 Facility

T. Rodovsky
Polestar Technical Services, Inc.

Date Published
June 2025

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract 89303320DEM000030

CPCCo
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APPROVED
By Julia Killinger at 7:55 am, Jun 25, 2025

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ENVIRONMENTAL CALCULATION COVER PAGE

CPCC-PRO-EP-40205

SECTION 1 - COMPLETED PRIOR TO CALCULATION BEING PERFORMED

Calculation Number: ECF-324 BLDG-17-0086 Revision Number: 1

Project: 324

Date: 06/16/2025

Calculation Title:

Total Effective Dose Equivalent Calculation for D4 of the 324 Facility

Calculation Purpose:

Calculate the total effective dose equivilent (TEDE) from 324 Facility D4 Activities to the Maximum Exposed Individual (MEI). Nathan Clark is the checker for the body of the calculation. Karin Price is the checker for Attachments A through F. Rick Reeder is the Senior Reviewer and checker for Attachments G through M.

Will this calculation utilize an environmental model or risk assessment? ☐ Yes ☒ No

If "Yes" box is checked, forward this form **and** form A-6007-637, *Environmental Model Package Report Cover Page* to the Risk and Modeling Integration Manager with Section 1 completed for both forms.

ROLE ASSIGNMENTS AND QUALIFICATIONS SUMMARY

Preparer(s):

Name: Tom Rodovsky

Professional License(s): Professional Engineer, Environmental, Washington State

Brief Narrative of Experience: Tom Rodovsky has led and/or performed over 100 Hanford radiological technical air emissions evaluations to date. These air emissions evaluations include radiological source term development, establishing the annual possession quantities (APQ) and releases rates, calculating the potential to emit (PTE), evaluating appropriate release fractions (RF), evaluation the best available radionuclide control technology (BARCT), and establishing inventory controls and handling limits for the Hanford Site.

Checker(s):

Name: Nathan Clark

Professional License(s): EIT WA State license # 24015228

Brief Narrative of Experience: Nathan Clark is an Associate Engineer at Polestar Technical Services, focusing on the cleanup of the 324 Building at the Hanford Site. With a year of experience in Hanford operations, Nathan began his career at the U.S. Department of Energy before transitioning to his current role. He is actively working toward completing his Qualification Card for Hanford Radiological Air Emissions.

ENVIRONMENTAL CALCULATION COVER PAGE (Continued)

Name: Karen Price

Professional License(s): None

Brief Narrative of Experience: Ms. Price has more than 20 years of experience at sites within the DOE Environmental Management complex. She has led/performed work characterizing waste, including calculations to determine whether waste exceeds toxicity characteristics. She recently served as Deputy Director of Operations for the Portsmouth On-Site Waste Disposal Facility(OSWDF). Since 2021, Ms. Price has also been responsible for calculating the radionuclide inventory of the Portsmouth OSWDF and comparison of the disposed nuclide inventory to the facility Performance Assessment model under DOE Order 435.1-1. Ms. Price has completed the Qualification Card for Hanford Radiological Air Emissions program through Polestar Technical Services.

Senior Reviewer(s):

Name: Rick Reeder

Professional License(s): None

Brief Narrative of Experience: Rick Reeder has over 20 years of experience as a Health Physicist/ Radiological Engineer with the Hanford Site, primarily supporting characterization and demolition of high radiological hazard facilities. He has authored numerous facility radiological characterization documents, radiological air emissions evaluations focusing on worker protection, and has formally reviewed several environmental air emissions evaluations. He is an experienced user of Radcalc software.

Responsible Manager:

Brent Porter
Print First and Last Name

Porter, Brenton R Digitally signed by Porter, Brenton R Date: 2025.06.18 09:07:28 -07'00'
Signature / Date

SECTIONS 2 - REVISION HISTORY

Revision No.	Description	Date

ENVIRONMENTAL CALCULATION COVER PAGE (Continued)

Revision No.	Description	Date
1	A summary of items revised in this revision include: • Updates to 324 Facility D4 approach *Remediation of the 300-296 will not be performed from within the B Cell *300-296 UPR waste site soil will not be placed within the REC cells *Saw cuts and monolith removal of the REC cells • Updates to the meteorology used in CAP88 to current wind data from 2015 to 2023. • Updates to the map of hypothetical maximally exposed individuals (MEIs), given the changes in the DOE Hanford Site boundary, DOE leased land, and DOE land transfers • Radiological decay waste inventories to current day • Updates to the 324 Facility D4 schedule. • Updates to the point source and fugitive source CAP88 runs to reflect updated PTE values (Attachment C, D, E, and F). • Updates to the calculation to reflect which activities that will be performed while the stack is operational (point source emissions) and those that will be performed after the stack is not operational (fugitive source emissions). • Updates to the radiological inventories based on most recent data and characterization • Updates to the PTE estimates based on new D4 plan • Updates to the PTE estimates for saw cutting based on new D4 plan • Updates to the calculation to reflect that final grouting of some areas will be performed during the fugitive source phase instead of the point source phase of the project.	

SECTION 3 - DOCUMENT REVIEW AND APPROVAL

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Print First and Last Name	Position	Signature	Date
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Checker(s):

Print First and Last Name	Position	Signature	Date
Nate Clark	Mechanical Engineer	Clark, Nathan W Digitally signed by Clark, Nathan W Date: 2025.06.17 06:18:45 -07'00'	
Karen Price	Senior Engineer	Karen Price Digitally signed by Karen Price Date: 2025.06.18 16:22:31 -04'00'	

Senior Reviewer(s):

Print First and Last Name	Position	Signature	Date
Rick Reeder	Radiological Control Engineer	Reeder, Ricky Digitally signed by Reeder, Ricky Date: 2025.06.17 14:03:27 -07'00'	

Responsible Manager:

Print First and Last Name	Position	Signature	Date
Brent Porter	Environmental Manager	Porter, Brenton R Digitally signed by Porter, Brenton R Date: 2025.06.18 09:26:54 -07'00'	

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Nate Clark	**Date**	6/16/25	**Sheet No**	1 of 82		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

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Checked	Nate Clark	**Date**	6/16/25	**Sheet No**	3 of 82		
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Attachments

A. 300 Area Weather Station Wind File
B. Map showing distance to the MEI from the 324 Facility
C. CAP88 Synopsis and Summary Report – Stack/Point Source Emissions -Offsite MEIs
D. CAP88 Synopsis and Summary Report – Stack/Point Source Emissions -Onsite MEIs
E. CAP88 Synopsis and Summary Report – Fugitive Source Emissions -Offsite MEIs
F. CAP88 Synopsis and Summary Report – Fugitive Source Emissions -Onsite MEIs
G. Radioactive Decay of A Cell Inventories – RadCalc Summary Reports
H. Radioactive Decay of B Cell Inventories – RadCalc Summary Reports
I. Radioactive Decay of C Cell Inventories – RadCalc Summary Reports
J. Radioactive Decay of D Cell Inventories – RadCalc Summary Reports
K. Radioactive Decay of REC Airlock Cell Inventories – RadCalc Summary Reports
L. Radioactive Decay of REC Airlock Pipe Trench Inventories – RadCalc Summary Reports
M. Radioactive Decay of SMF South Cell Inventories – RadCalc Summary Reports

Acronyms and Abbreviations

ABC	Asbestos Binding Compound
Ci	Curie
CBWS	Crib Waste Sewer
CPCC	Central Plateau Cleanup Contract
D4	Deactivation, Decommissioning, Decontamination, and Demolition
DOE	Department of Energy
ENW	Energy Northwest
ERDF	Environmental Restoration Disposal Facility
HEPA	High Efficiency Particulate Air
HGIS	Hanford Geographic Information System
HLV	High-Level Vault
LLV	Low-Level Vault
LIGO	Laser Interferometer Gravitational-Wave Observatory
MEI	Maximally Exposed Individual
POG	Process Off Gas
PTE	Potential to Emit
REC	Radiochemical Engineering Complex
RF	Release Fraction
RLWS	Radioactive Liquid Waste Sewer
RRLWS	Retired Radioactive Liquid Waste Sewer
SMF	Shielded Materials Facility
TEDE	Total Effective Dose Equivalent
TRIDEC	Tri-City Development Council
VV	Vessel Ventilation
WAC	Washington Administrative Code
WCH	Washington Closure Hanford

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Nate Clark	**Date**	6/16/25	**Sheet No**	4 of 82		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

1.0 Purpose and Scope

The purpose of this calculation is to determine the total effective dose equivalent (TEDE) (in mrem/year) to the maximally exposed individual (MEI) resulting from point source (abated and unabated) and potential fugitive source (unabated) air emissions from the 324 Facility deactivation, decommissioning, decontamination, and demolition (D4). With the facility intact and exhaust stack (EP-324-01-S) operational, specific D4 activities will be performed. D4 activities include filling the A-Frame high efficiency particulate air filter pit (Room 15) with grout for subsequent monolithic removal. Zone I and II ventilation exhaust via the exhaust stack. Only Zone 1 becomes non-functional when the A-Frame HEPA filters are grouted. Once the A-Frame HEPA filters are solidified, the exhaust stack is assumed to no longer be functional as designed and emissions will be considered fugitive.

This calculation estimates the TEDE to the MEI in accordance with 40 CFR 61.93 (a) and WAC 246-247-110 (15). This calculation supersedes *Total Effective Dose Equivalent Calculation for 324 Facility and 300-296 Waste site Remediation*, ECF-324-BLDG-17-0086, Revision 0 (CHPRC 2017).

A summary of items revised in this revision include:

- Updates to 324 Facility D4 approach
  - Remediation of the 300-296 will not be performed from within the B Cell
  - 300-296 UPR waste site soil will not be placed within the REC cells
  - Saw cuts and monolith removal of the REC cells
- Updates to the meteorology used in CAP88 to current wind data from 2015 to 2023.
- Updates to the map of hypothetical maximally exposed individuals (MEIs), given the changes in the DOE Hanford Site boundary, DOE leased land, and DOE land transfers
- Radiological decay waste inventories to current day
- Updates to the 324 Facility D4 schedule.
- Updates to the point source and fugitive source CAP88 runs to reflect updated PTE values (Attachment C, D, E, and F).
- Updates to the calculation to reflect which activities that will be performed while the stack is operational (point source emissions) and those that will be performed after the stack is not operational (fugitive source emissions).
- Updates to the radiological inventories based on most recent data and characterization
- Updates to the PTE estimates based on new D4 plan
- Updates to the PTE estimates for saw cutting based on new D4 plan
- Updates to the calculation to reflect that final grouting of some areas will be performed during the fugitive source phase instead of the point source phase of the project.

The scope of this calculation addresses piping within the building. Piping that exists outside the building footprint are addressed by other TEDE calculations. The RLWS, RRLWS, 300-15, 300-214, and 300-265 piping TEDE are addressed in *300 Area Remaining Sites Total Effective Dose Equivalent Calculation*, 0300X-CA-V0180 (WCH, 2014a).

The 300-296 unplanned release (UPR) waste site and 300-265 transfer line are addressed in different calculations / Air Monitoring Plans that address remedial actions. As discussed in Section 3.16, incidental contaminated soil that may be encountered during below grade D4 activities is evaluated.

Also, portions of the 300-265 transfer line that may be encountered within the layback of below grade D4 activities is addressed in Section 3.15.

2.0 Facility D4 Schedule

The current 324 Facility schedule shows D4 activities occurring within the facility with the stack operational in 2025 and 2026 and stack being shut down in 2026. Therefore, point source emissions are assumed to occur over 2 years (2025 and 2026).

Once the A-Frame HEPA filters are solidified the exhaust stack is assumed to be no longer operational and remaining activities will be considered fugitive source emissions. The schedule shows that D4 activities, including monolith saw cutting and disposition, will occur in 2026 through 2028. From 2028 through 2034, remediation of the 300-296 UPR waste site will occur. In 2034 and 2035, the remaining below grade D4 activities will occur include disposition of final monoliths from the 324 Facility site. Therefore, fugitive activities are assumed to occur over 5 years (2026, 2027, 2028, 2034, and 2035).

Table 1 provides a summary of work activities that show which will be performed prior to the exhaust stack being shut down (point source emissions) and those after the stack is no longer operational (fugitive source emissions).

Table 1 – Breakdown of Work Activities (Point Source or Fugitive Source)

A	B	C
Work Activity	Point Source Emissions	Fugitive Source Emissions
Movement of items within REC cells and out of the REC Cells for waste disposal and combustible removal	✓	--
Apply fixative to REC Cells and Airlock Cell/Trench	✓	--
Apply fixative to REC ductwork	✓	--
Grouting of REC Cells and Airlock	✓	--
Grouting of REC Airlock Trench	✓	✓
Low Level Vault / High Level Vault – Grouting of tanks, pots, and entire vault	✓	--
Fixing surface contamination and/or grouting of HLV/LLV, and portions of the RLWS, RRLWS, and CBWS piping	✓	--
A-Frame HEPA Filter stabilization	✓	--
Fixing surface contamination and/or grout stabilization of process off gas (POG) piping, vessel ventilation (VV) piping, as needed / when accessible	✓	✓
Removal of Zone I and II containments, and HEPA filters throughout facility	✓	✓
Saw cuts to REC, REC Airlock, REC Airlock Trench, SMF, LLV, HLV, A-Frame Filters, and REC Ductwork to support monolithic removal and transport	--	✓
Conventional Demolition of 324 Building	--	✓
Monolith rigging and transportation – REC Cells, REC Airlock, REC Airlock Trench, SMF South Cell, HLV, LLV, and A-Frame filter pit	--	✓
Demolition of remaining slab/foundation and piping within building	--	✓
Incidental[1] removal of contaminated below grade soil during D4 and monolith removal (e.g., 300-296 waste site contaminated soil)	--	✓
Removal of below-grade piping below and adjacent to building footprint	--	✓
Removal of 300-265 transfer line that lies within layback of 324 Facility D4	--	✓

[1] Since the horizontal and vertical extent of the 300-296 waste site or other contaminated soil potentially below the 324 facility is unknown, monolith or below-grade demolition excavations may encounter these contaminated soils.

3.0 Calculation

The following subsections provide a description of activities and radiological inventory, and calculate a PTE for each of the areas with contamination remaining within the 324 Facility. Incidental contamination within other portions of the facility may be encountered, but is anticipated to be bounded by the conservative inventory and assumptions used in the following subsections.

Extensive stabilization of the building's radiological inventory is discussed within the following subsections. Stabilization will occur using a variety of methods and products based on what is appropriate for each individual area of the building. The two major categories of stabilization are 1) "fixing" surface contamination by application of a coating of a specific material (e.g., Asbestos Binding Compound (ABC), 3M FireDam, paint, glycerin fog) onto the contaminated surface to bind the material to the surface, and 2) stabilizing contamination in an area of the building by filling a volume with a material (e.g., grout, epoxy) that will dry/cure and create a solid volume.

3.1 A Cell (REC)

A Cell has internal floor dimensions of 9ft 3in (111 in) by 21ft (252 in) (per H-3-20160) with an internal cell height of 33 ft (396 in) (per H-3-20213). A Cell is sometimes referred to as the "High Bay Cell" in historical documents and drawings. A Cell has received most of the miscellaneous items previously located throughout the REC cells (see Tables 3, 4, and 5). Grout will encapsulate the grout containers and other debris which currently reside in A Cell. The entire cell will be filled with grout. The A Cell may be disposed of as a single large monolith. However, two monoliths are conservatively assumed, with one horizonal cut located above the waste containers and debris that resides on the floor of the A Cell.

3.1.1 Inventory

The inventory for the residual contamination located on the floor, walls, and cranes/ceiling of the A Cell was obtained from Table 24 of calculation 0300X-CA-N0115, *Revised Radiological Inventory for the 324 Building Radiochemical Engineering Cell, Airlock and Pipe Trench*, Revision 0 (WCH, 2010a). Radioactive decay of this inventory was performed with RadCalc from 1/1/10 to 1/1/26. Decayed radionuclide inventories less than 1E-08 Ci were not included. The RadCalc software run showing the starting inventory and decayed inventory is shown in Attachment G. The decayed inventory is shown in Table 2.

The grout containers and all discrete items that reside on the bottom of the hot cell discussed in Sections 3.1.1 through 3.1.17 of WCH, 2010a are shown in Tables 3 through 5. The RadCalc software run showing the starting inventory and decayed inventory for each items are shown in Attachment G. Radioactive decay of this inventory was performed with RadCalc from 1/1/10 to 1/1/26. Decayed radionuclide inventories less than 1E-08 Ci were not included. Daughter products shown in the RadCalc decayed radionuclide inventory (e.g., Pa-233, U-234, U-235m, U-237, and Np-237) were not included because they do not contribute significantly to the TEDE.

Miscellaneous debris within the B Cell has been moved into the A Cell for grout stabilization. These items included B Cell debris bins, lifting devices, and other miscellaneous debris. Radiological evaluations have been performed to estimate the inventory of these items, but given the high radiological background of the B Cell, these evaluations have not been formalized. These evaluations have conservatively estimated that all of the items combined equal that of all of the grout containers shown in Table 3. The inventory is shown in Column J of Table 5.

Table 2 – A Cell Residual Contamination

A	B
Nuclide	**Inventory (Ci)**
Co-60	2.11E-05
Se-79	1.03E-06
Sr-90	9.80E-01
Y-90	9.80E-01
Tc-99	
Sb-125	
Te-125m	
Cs-134	
Cs-137	1.88E+00
Ba-137m	1.78E+00
Eu-154	9.88E-04
Eu-155	1.72E-04
Pu-238	8.24E-04
Pu-239	3.02E-04
Pu-240	2.98E-04
Pu-241	4.75E-03
Pu-242	4.94E-07
Am-241	4.53E-03
Cm-243	1.60E-05
Cm-244	7.83E-04

Table 3 – Grout Container Inventory in A Cell

A	B	C	D	E	F	G	H	I
Nuclide	**Grout Container 166 (Ci)**	**Grout Container 172 (Ci)**	**Grout Container 173 (Ci)**	**Grout Container 167 (Ci)**	**Grout Container 168 (Ci)**	**Grout Container 169 (Ci)**	**Grout Container 170 (Ci)**	**Grout Container 171 (Ci)**
Co-60	1.49E-04	1.49E-04	1.49E-04					
Se-79	1.15E-05	1.15E-05	1.15E-05	4.25E-05	3.25E-04	1.60E-05	1.34E-05	1.15E-05
Sr-90	1.01E+01	1.01E+01	1.01E+01	2.52E+01	1.93E+02	9.52E+00	7.96E+00	6.87E+00
Y-90	1.01E+01	1.01E+01	1.01E+01	2.53E+01	1.93E+02	9.53E+00	7.96E+00	6.87E+00
Tc-99	3.81E-04	3.81E-04	3.81E-04	1.41E-03	1.08E-02	5.31E-04	4.45E-04	3.82E-04
Sb-125				5.22E-04	3.98E-03	1.96E-04	1.64E-04	1.41E-04
Te-125m				1.24E-04	9.45E-04	4.64E-05	3.90E-05	3.35E-05
Cs-134								
Cs-137	1.93E+01	1.93E+01	1.93E+01	2.59E+01	1.98E+02	9.75E+00	8.16E+00	7.05E+00
Ba-137m	1.82E+01	1.82E+01	1.82E+01	2.45E+01	1.87E+02	9.20E+00	7.70E+00	6.66E+00
Eu-154	8.36E-03	8.36E-03	8.36E-03	2.67E-02	2.04E-01	1.00E-02	8.42E-03	7.24E-03
Eu-155	1.17E-03	1.17E-03	1.17E-03					
Pu-238	8.90E-03	8.90E-03	8.90E-03	6.80E-03	5.19E-02	2.56E-03	2.15E-03	1.84E-03
Pu-239	3.36E-03	3.36E-03	3.36E-03	2.52E-03	1.93E-02	9.49E-04	7.96E-04	6.83E-04
Pu-240	3.32E-03	3.32E-03	3.32E-03	2.58E-03	1.97E-02	9.69E-04	8.13E-04	6.97E-04
Pu-241	4.47E-02	4.47E-02	4.47E-02	4.12E-02	3.14E-01	1.55E-02	1.30E-02	1.11E-02
Pu-242	5.50E-06	5.50E-06	5.50E-06	4.14E-06	3.16E-05	1.56E-06	1.31E-06	1.12E-06
Am-241	5.04E-02	5.04E-02	5.04E-02	1.76E-01	1.35E+00	6.64E-02	5.56E-02	4.78E-02
Cm-243	1.64E-04	1.64E-04	1.64E-04	5.66E-04	4.33E-03	2.13E-04	1.78E-04	1.53E-04
Cm-244	7.62E-03	7.62E-03	7.62E-03	2.78E-02	2.12E-01	1.04E-02	8.75E-03	7.51E-03

Table 4 – Miscellaneous Items Located in A Cell (1 of 2)

A	B	C	D	E	F	G	H
Nuclide	**Power Hawk Tray from D Cell (Ci)**	**Full Box from B Cell Inventory (Ci)**	**Empty Box from B Call Inventory (Ci)**	**30 Gallon Drum from B Cell (Ci)**	**ESP Frame from B-Cell (Ci)**	**ESP Filters from B Cell (Ci)**	**B Cell Shop Vacuum (Ci)**
Co-60	2.71E-04	2.87E-05		1.13E-05			
Se-79	1.29E-06	2.21E-06	3.11E-07	8.69E-07	1.58E-06	1.65E-07	4.16E-07
Sr-90	9.39E-01	1.94E+00	2.42E-01	7.62E-01	1.23E+00	1.28E-01	3.22E-01
Y-90	9.39E-01	1.94E+00	2.42E-01	7.62E-01	1.23E+00	1.28E-01	3.22E-01
Tc-99	4.27E-05	7.35E-05	1.03E-05	2.89E-05	5.24E-05	5.44E-06	1.37E-05
Sb-125							
Te-125m							
Cs-134	2.49E-07						
Cs-137	4.83E+00	3.73E+00	5.77E-01	1.47E+00	2.93E+00	3.05E-01	7.67E-01
Ba-137m	4.56E+00	3.52E+00	5.44E-01	1.38E+00	2.77E+00	2.88E-01	7.24E-01
Eu-154	5.83E-03	1.61E-03	2.10E-04	6.33E-04	1.07E-03	1.11E-04	2.81E-04
Eu-155		2.26E-04		8.85E-05			
Pu-238	1.01E-03	1.72E-03	2.42E-04	6.76E-04	1.23E-03	1.28E-04	3.23E-04
Pu-239	5.05E-04	6.48E-04	6.27E-05	2.54E-04	3.19E-04	3.31E-05	8.36E-05
Pu-240	5.13E-04	6.41E-04	6.21E-05	2.52E-04	3.16E-04	3.29E-05	8.29E-05
Pu-241	6.73E-03	8.63E-03	8.30E-04	3.39E-03	4.23E-03	4.40E-04	1.11E-03
Pu-242	8.28E-07	1.06E-06	1.03E-07	4.17E-07	5.24E-07	5.44E-08	1.37E-07
Am-241	5.80E-03	9.72E-03	1.34E-03	3.81E-03	6.78E-03	7.05E-04	1.78E-03
Cm-243	8.36E-05	3.17E-05	3.96E-06	1.24E-05	2.01E-05	2.09E-06	5.28E-06
Cm-244	3.88E-03	1.46E-03	1.84E-04	5.78E-04	9.34E-04	9.72E-05	2.45E-04

Table 5 – Miscellaneous Items Located in A Cell (2 of 2)

A	B	C	D	E	F	G	H	I	J
Nuclide	**24-Pin Fuel Storage Container from B-Cell Ci)**	**B-Cell Work Tray No. 1 (Ci)**	**B-Cell Work Tray No. 2 (Ci)**	**10 Gallon Drum from B Cell (Ci)**	**B Cell Crawler (Ci)**	**Clamshell from B Cell (Ci)**	**D Cell Dust Stop Filter (Ci)**	**Refractory Block Inventory (Ci)**	**B Cell Debris moved into A Cell (Ci)**
Co-60				9.65E-06			9.17E-05		4.46E-04
Se-79	2.52E-06	1.15E-06	6.51E-07	7.45E-07	1.63E-06	1.67E-07	4.37E-07		4.43E-04
Sr-90	1.95E+00	8.91E-01	5.05E-01	6.53E-01	1.26E+00	1.30E-01	3.18E-01	2.21E+02	2.72E+02
Y-90	1.95E+00	8.91E-01	5.05E-01	6.53E-01	1.26E+00	1.30E-01	3.18E-01	2.21E+02	2.72E+02
Tc-99	8.35E-05	3.81E-05	2.15E-05	2.48E-05	5.38E-05	5.53E-06	1.45E-05		1.47E-02
Sb-125									5.01E-03
Te-125m									1.19E-03
Cs-134							8.42E-08		
Cs-137	4.67E+00	2.14E+00	1.21E+00	1.25E+00	3.01E+00	3.10E-01	1.64E+00	3.15E+02	3.07E+02
Ba-137m	4.41E+00	2.02E+00	1.14E+00	1.18E+00	2.85E+00	2.92E-01	1.55E+00	2.97E+02	2.90E+02
Eu-154	1.70E-03	7.79E-04	4.40E-04	5.42E-04	1.10E-03	1.13E-04	1.97E-03	1.46E-03	2.82E-01
Eu-155				7.59E-05					3.52E-03
Pu-238	1.96E-03	8.99E-04	5.06E-04	5.79E-04	1.26E-03	1.30E-04	3.38E-04	2.18E-04	9.20E-02
Pu-239	5.08E-04	2.32E-04	1.31E-04	2.18E-04	3.28E-04	3.37E-05	1.71E-04	8.32E-03	3.43E-02
Pu-240	5.04E-04	2.30E-04	1.30E-04	2.16E-04	3.25E-04	3.34E-05	1.74E-04	2.64E-03	3.47E-02
Pu-241	6.73E-03	3.08E-03	1.74E-03	2.91E-03	4.35E-03	4.47E-04	2.28E-03		5.29E-01
Pu-242	8.35E-07	3.81E-07	2.15E-07	3.57E-07	5.38E-07	5.53E-08	2.81E-07		5.62E-05
Am-241	1.08E-02	4.94E-03	2.79E-03	3.27E-03	6.98E-03	7.17E-04	1.97E-03	1.34E-03	1.84E+00
Cm-243	3.21E-05	1.47E-05	8.29E-06	1.06E-05	2.07E-05	2.13E-06	2.84E-05		5.93E-03
Cm-244	1.49E-03	6.80E-04	3.84E-04	4.93E-04	9.61E-04	9.88E-05	1.32E-03		2.89E-01

3.1.2 Release Fraction

Current in-cell conditions (prior to fixative application), per WCH, 2010a, establish the ratio of fixed contamination to removable contamination in the Radiochemical Engineering Complex (REC) Cells as 30-to-1. As such, removable and fixed contamination fractions are 1 part in 31 and 30 parts in 31 of the affected inventory, respectively. Consistent with WAC 246-247, removable contamination will apply a release fraction (RF) of 1E-03 (consistent with particulates) and fixed contamination will apply a RF of 1E-06 (consistent with solids).

The entire cell will be filled with grout. The A Cell may be disposed of as a single large monolith. However, two monoliths are conservatively assumed, with one horizonal cut located above the waste containers and debris that resides on the floor of the A Cell. The contamination on the four walls that will be affected by the kerf of the saw cut will apply a release fraction of 1E-03.

3.1.3 Point Source PTE

The point source PTE includes the inventories shown in Tables 2 through 5. All activities are assumed to occur over 2 years. All inventories, with the exception of the Refractory Block Inventory, are assumed to have a 30-to-1 ratio of fixed contamination to removable contamination. The Refractory Block inventory is assumed to be 100% fixed. Table 6 shows the Point Source PTE for the A Cell. The PTE was calculated as follows:

$$= \frac{(\text{Item Inventory, Except Refractory Block, Ci})(\text{RF of } 1\text{E}-03)(\text{Fraction of Removable Contamination, } 1/31)}{\text{Duration of Activity, 2 years}}$$

$$+ \frac{(\text{Item Inventory, Except Refractory Block, Ci})(\text{RF of } 1\text{E}-06)(\text{Fraction of Fixed Contamination, } 30/31)}{\text{Duration of Activity, 2 years}}$$

$$+ \frac{(\text{Refractory Block Inventory, Ci})(\text{RF of } 1\text{E}-06)}{\text{Duration of Activity, 2 years}}$$

$$+ \frac{(\text{Residual Contamination Inventory, Ci})(\text{RF of } 1\text{E}-03)(\text{Fraction of Removable Contamination, } 1/31)}{\text{Duration of Activity, 2 years}}$$

$$+ \frac{(\text{Residual Contamination Inventory, Ci})(\text{RF of } 1\text{E}-06)(\text{Fraction of Fixed Contamination, } 30/31)}{\text{Duration of Activity, 2 years}}$$

Table 6 – A Cell Point Source PTE

A	B
Nuclide	**PTE (Ci/yr)**
Co-60	2.20E-08
Se-79	1.50E-08
Sr-90	9.36E-03
Y-90	9.37E-03
Tc-99	4.97E-07
Sb-125	1.66E-07
Te-125m	3.95E-08
Cs-134	5.53E-12
Cs-137	1.09E-02
Ba-137m	1.03E-02
Eu-154	9.66E-06
Eu-155	1.26E-07
Pu-238	3.25E-06
Pu-239	1.21E-06
Pu-240	1.22E-06
Pu-241	1.84E-05
Pu-242	1.97E-09
Am-241	6.24E-05
Cm-243	2.02E-07
Cm-244	9.84E-06

3.1.4 Fugitive Source PTE

Conservatively, one horizonal cut will be assumed, which will be located above the waste containers and debris that resides on the floor of the A Cell. The contamination on the four walls that will be affected by the kerf of the saw cut will apply a release fraction of 1E-03.

The inventory for all residual surface contamination was obtained from Table 2.

The A Cell has internal floor and ceiling dimensions of 21 ft (252 in) in the east/west axis by 9 ft 3in (111 in) in the north/south axis (per H-3-20160). Therefore, the area is:

$$= (252\ \text{in})(111\ \text{in})(2) = 55{,}944\ \text{in}^2$$

The internal cell height of the A Cell is 33 ft (396 in) (per H-3-20213). The total area of the East and West walls are therefore:

$$= (111\ \text{in})(396\ \text{in})(2\ \text{walls}) = 87{,}912\ \text{in}^2$$

The total area of the North and South walls are:

$= (252 \text{ in})(396 \text{ in})(2 \text{ walls}) = 199{,}584 \text{ in}^2$

The total area of the walls, floor and ceiling are summed:

$= (55{,}944 \text{ in}^2) + (87{,}912 \text{ in}^2) + (199{,}584 \text{ in}^2) = 343{,}440 \text{ in}^2$

The area affected by the one horizonal cut is calculated as follows.

$= (252 \text{ in} + 252 \text{ in} + 111 \text{ in } + 111\text{in})(0.512 \text{ in width}) = 371.71 \text{ in}^2$

The fugitive source PTE will be calculated as follows:

$$= \frac{(\text{Inventory from Table 2, Ci})(\text{Area Saw Cut, } 371.71 \text{ in}^2)(\text{RF of } 1\text{E} - 03)}{(\text{Total Surface Area, } 343{,}440 \text{ in}^2)(\text{Duration of Activity, 5 years})}$$

Table 7 – A Cell Fugitive Source PTE

A	B
Nuclide	**PTE (Ci/yr)**
Co-60	4.57E-12
Se-79	2.23E-13
Sr-90	2.12E-07
Y-90	2.12E-07
Tc-99	
Sb-125	
Te-125m	
Cs-134	
Cs-137	4.07E-07
Ba-137m	3.84E-07
Eu-154	2.14E-10
Eu-155	3.71E-11
Pu-238	1.78E-10
Pu-239	6.54E-11
Pu-240	6.46E-11
Pu-241	1.03E-09
Pu-242	1.07E-13
Am-241	9.80E-10
Cm-243	3.47E-12
Cm-244	1.70E-10

3.2 B Cell (REC)

B Cell has internal floor dimensions of 22 ft (264 in) by 25 ft (300 in) (per H-3-20160) with an internal cell height of 30ft 6in (366 in) (per Drawing H-3-20214). B Cell is sometimes referred to as the “Low Bay Cell” in historical documents and drawings. Grout containers and discrete items that once resided within B Cell were moved to A Cell and will be grouted in place as discussed in Section 3.1. Fixative will be applied to all surfaces within the cell prior to shut down of the facility’s ventilation system. Saw cutting activities will be performed during the fugitive source emissions phase.

3.2.1 Inventory

The inventory from the B Cell was obtained from Table 27 of WCH, 2010a and decay corrected using RadCalc. The radiological inventories for the walls above -9 ft from grade and ceiling inventory were used. The floor, sump, trench, and walls below -9 ft from grade will be covered with grout, therefore will have no PTE. The RadCalc software run showing the starting inventory and decayed inventory for each items are shown in Attachment H. Decayed radionuclide inventories less than 1E-08 Ci were not included. Daughter products shown in the RadCalc decayed radionuclide inventory (e.g., Pa-233, U-234, U-235m, U-237, and Np-237) were not included because they do not contribute significantly to the TEDE. Radioactive decay of this inventory was performed with RadCalc from 3/23/10 to 1/1/26. The initial radioactive inventory coincided with the date that dose profile surveys were taken that form the basis for the B Cell Inventory. Miscellaneous items within the B Cell has been moved into the A Cell for grout stabilization. These items include debris bins, lifting devices, and other miscellaneous debris and are addressed in Section 3.1.1.

Table 8 - B Cell Residual Contamination

A	B	C
Nuclide	**Walls Above -9 ft (Ci)**	**Ceiling (Ci)**
Co-60	2.66E-02	3.50E-03
Se-79	4.70E-04	6.19E-05
Sr-90	5.41E+02	7.11E+01
Y-90	5.41E+02	7.12E+01
Tc-99	1.56E-02	2.06E-03
Sb-125		
Te-125m		
Cs-134		
Cs-137	1.02E+03	1.35E+02
Ba-137m	9.64E+02	1.27E+02
Eu-154	8.29E-01	1.09E-01
Eu-155	2.30E-01	3.04E-02
Pu-238	3.99E-01	5.26E-02
Pu-239	1.38E-01	1.81E-02
Pu-240	1.36E-01	1.79E-02
Pu-241	3.15E+00	4.14E-01
Pu-242	2.25E-04	
Am-241	2.06E+00	2.71E-01
Cm-243	8.82E-03	1.16E-03
Cm-244	4.78E-01	6.32E-02

3.2.2 Release Fraction

Contaminated surface areas within the cell will be coated with fixative prior to saw cutting and also after saw cutting activities. The fixative will be designed to fix in place surface contamination and eliminate potential for emissions during rigging operations, packaging and transportation offsite. Current in-cell conditions (prior to fixative application), per WCH, 2010a, establish the ratio of fixed contamination to removable contamination in the REC Cells as 30-to-1. As such, removable and fixed contamination fractions are 1 part in 31 and 30 parts in 31 of the affected inventory, respectively. Additional fixative may be applied to wall surfaces after removal from the facility prior to packaging and transportation offsite. Removable contamination will apply a RF of 1E-03 (consistent with particulates in WAC-246-247) and fixed contamination will apply a RF of 1E-06 (consistent with solids in WAC 246-247).

Consistent with WAC 246-247, a RF of 1E-03 will be applied to the inventory that will be disturbed by saw cutting activities and is assumed to all be in the form of particulate. Saw cutting activities will use water to control dust and for cooling of the cutting mechanism.

3.2.3 Point Source PTE

Point source emission activities will occur over two years. Consistent with WAC 246-247, removable contamination will apply a RF of 1E-03 (consistent with particulates) and fixed contamination will apply a RF of 1E-06 (consistent with solids) for the walls above -9 ft from grade and ceiling. The PTE for each nuclide was calculated as follows:

$$= \frac{(\text{Wall and Ceiling Inventory, Ci})(\text{RF of } 1\text{E} - 03)(\text{Fraction of Removable Contamination}, 1/31)}{\text{Duration of Activity}, 2 \text{ years}}$$

$$+ \frac{(\text{Wall and Ceiling Inventory, Ci})(\text{RF of } 1\text{E} - 06)(\text{Fraction of Fixed Contamination}, 30/31)}{\text{Duration of Activity}, 2 \text{ years}}$$

Table 9 – B Cell Point Source PTE

A	B
Nuclide	**PTE (Ci/yr)**
Co-60	5.00E-07
Se-79	8.84E-09
Sr-90	1.02E-02
Y-90	1.02E-02
Tc-99	2.93E-07
Sb-125	
Te-125m	
Cs-134	
Cs-137	1.92E-02
Ba-137m	1.81E-02
Eu-154	1.56E-05
Eu-155	4.33E-06
Pu-238	7.50E-06
Pu-239	2.59E-06
Pu-240	2.56E-06
Pu-241	5.92E-05
Pu-242	3.74E-09
Am-241	3.87E-05
Cm-243	1.66E-07
Cm-244	8.99E-06

3.2.4 Fugitive Source PTE

After the facility's ventilation system is shut down, the B Cell will be dismantled with a diamond wire saw. Diamond wire widths of 10mm (0.394 in) – 13mm (0.512 in) will be used. The saw kerf width of 0.512 inches will conservatively be used for all cuts. Fugitive source emissions will occur over 5 years.

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Nate Clark	**Date**	6/16/25	**Sheet No**	18 of 82		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Two horizonal cuts will be assumed. The contamination on the four walls that will be affected by the kerf of the saw cut will apply a release fraction of 1E-03. The ceiling will not be affected by the saw cuts. The two saw cuts will be performed above the -9 ft from grade elevation. The floor, sump, trench, and walls below -9 ft from grade will have been covered with grout, and therefore will have no PTE.

The inventory for all residual surface contamination was obtained from Table 8.

The B Cell dimensions in the east/west axis are 25 ft (300 in) and the north/south axis are 22 ft (264 in) (per H-3-20160). The internal cell height of the B Cell is 20 ft 6 in (396 in) above grade (per H-3-20214) and the floor of the B Cell is at -10 ft (per H-3-20178).

The total area of the four walls (East, West, North, and South) above -9 ft from grade are therefore:

$$= (300\text{ in})(354\text{ in})(2\text{ walls}) + (264\text{ in})(354\text{ in})(2\text{ walls}) = 399{,}312\text{ in}^2$$

The area affected by the two horizonal cuts are calculated as follows:

$$= (300\text{ in})(0.512\text{ in width})(4) + (264\text{ in})(0.512\text{ in width})(4) = 1{,}155.07\text{ in}^2$$

The fugitive source PTE will be calculated as follows:

$$= \frac{(\text{Inventory from Table 8, Ci})(\text{Area Saw Cuts, } 1{,}155.07\text{ in}^2)(\text{RF of } 1\text{E} - 03)}{(\text{Total Surface Area}, 399{,}312\text{ in}^2)(\text{Duration of Activity}, 5\text{ years})}$$

Table 10 - B Cell Fugitive Source PTE

A	B
Nuclide	PTE (Ci/yr)
Co-60	1.54E-08
Se-79	2.72E-10
Sr-90	3.13E-04
Y-90	3.13E-04
Tc-99	9.03E-09
Sb-125	
Te-125m	
Cs-134	
Cs-137	5.91E-04
Ba-137m	5.58E-04
Eu-154	4.80E-07
Eu-155	1.33E-07
Pu-238	2.31E-07
Pu-239	7.98E-08
Pu-240	7.86E-08
Pu-241	1.82E-06
Pu-242	1.30E-10
Am-241	1.19E-06
Cm-243	5.10E-09
Cm-244	2.77E-07

3.3 C Cell (REC)

C Cell has internal floor dimensions of 12 ft (144 in) by 19 ft 4in (232 in) (per H-3-20160) with an internal cell height of 15 ft (180 in) (per H-3-20213). C Cell is sometimes referred to as the “Pyro Cell” in historical documents and drawings.

After the facility’s ventilation system is shut down, saw cutting activities will be performed to separate C and D Cell monoliths. This will be performed by performing one horizontal cut near the top of C Cell. No cuts will be made through D Cell.

3.3.1 Inventory

The inventory from the C Cell floor and walls were obtained from Table 28 of WCH, 2010a and decay corrected using RadCalc. The RadCalc software run showing the starting inventory and decayed inventory are shown in Attachment I. Radioactive decay of this inventory was performed with RadCalc from 1/1/10 to 1/1/26. Decayed radionuclide inventories less than 1E-08 Ci were not included. Daughter products shown in the RadCalc decayed radionuclide inventory (e.g., Pa-233, U-234, U-235m, U-237, and Np-237) were not included because they do not contribute significantly to the TEDE. The decayed inventory is shown in Table 11.

Table 11 - C Cell Residual Contamination Inventory

A	B	C
Nuclide	Floor (Ci)	Total on Walls (Ci)
Co-60	1.37E-06	6.92E-06
Se-79	1.05E-07	5.33E-07
Sr-90	9.25E-02	4.68E-01
Y-90	9.26E-02	4.68E-01
Tc-99	3.50E-06	1.77E-05
Sb-125		
Te-125m		
Cs-134		
Cs-137	1.77E-01	8.99E-01
Ba-137m	1.67E-01	8.48E-01
Eu-154	7.68E-05	3.88E-04
Eu-155	1.08E-05	5.44E-05
Pu-238	8.19E-05	4.15E-04
Pu-239	3.08E-05	1.56E-04
Pu-240	3.05E-05	1.55E-04
Pu-241	4.11E-04	2.08E-03
Pu-242	5.05E-08	2.56E-07
Am-241	4.63E-04	2.34E-03
Cm-243	1.51E-06	7.60E-06
Cm-244	6.97E-05	3.53E-04

3.3.2 Release Fraction

Current in-cell conditions, per WCH, 2010a, establish the ratio of fixed contamination to removable contamination in the REC Cells as 30-to-1. As such, removable and fixed contamination fractions are 1 part in 31 of the affected inventory, respectively. Removable contamination will apply a RF of 1E-03 (consistent with particulates in WAC 246-247) and fixed contamination will apply a RF of 1E-06 (consistent with solids in WAC 246-247).

Consistent with WAC 246-247, a RF of 1E-03 will be applied to the inventory that will be disturbed by saw cutting activities and is assumed to all be in the form of particulate. Saw cutting activities will use water to control dust and for cooling of the cutting mechanism.

3.3.3 Point Source PTE

Consistent with WAC 246-247, removable contamination will apply a RF of 1E-03 (consistent with particulates) and fixed contamination will apply a RF of 1E-06 (consistent with solids) for the walls and floor. Point source emission activities will occur over two years. Table 12 calculates the point source PTE for the C Cell. The PTE for each nuclide was calculated as follows:

$$= \frac{(\text{Wall and Floor Inventory, Ci})(\text{RF of 1E} - 03)(\text{Fraction of Removable Contamination, 1/31})}{\text{Duration of Activity, 2 years}}$$

$$+ \frac{(\text{Wall and Floor Inventory, Ci})(\text{RF of 1E} - 06)(\text{Fraction of Fixed Contamination, 30/31})}{\text{Duration of Activity, 2 years}}$$

Table 12 – C Cell Point Source PTE

A	B
Nuclide	**PTE (Ci/yr)**
Co-60	1.38E-10
Se-79	1.06E-11
Sr-90	9.31E-06
Y-90	9.32E-06
Tc-99	3.52E-10
Sb-125	
Te-125m	
Cs-134	
Cs-137	1.79E-05
Ba-137m	1.69E-05
Eu-154	7.72E-09
Eu-155	1.08E-09
Pu-238	8.26E-09
Pu-239	3.10E-09
Pu-240	3.08E-09
Pu-241	4.13E-08
Pu-242	5.09E-12
Am-241	4.66E-08
Cm-243	1.51E-10
Cm-244	7.02E-09

3.3.4 Fugitive Source PTE

Fixative will be applied to C Cell surfaces prior to stabilization and shutdown of the facility's ventilation system. C Cell will be grouted after shut down of the facility's ventilation system. After C Cell is entirely grouted, a single horizontal cut will be made near the ceiling of the cell to separate the C Cell monolith from the D Cell monolith. The C Cell monolith will be transported and disposed of at the ERDF as a single unit.

Diamond wire widths of 10mm (0.394 in) – 13mm (0.512 in) will be used. The saw kerf width of 0.512 inches will conservatively be used for all cuts. Fugitive source emissions will occur over 5 years.

The C Cell has internal floor dimensions of 12 ft (144 in) in the north-south axis by 19 ft 4in (232 in) in the east-west axis (per H-3-20160) with an internal cell height of 15 ft (180 in) (per H-3-20213). The total area of the four C Cell walls is:

$$= (144 \text{ in})(180 \text{ in})(2 \text{ walls}) + (232 \text{ in})(180 \text{ in})(2 \text{ walls}) = 135{,}360 \text{ in}^2$$

The area affected by saw cuts are calculated as follows.

$$= (1 \text{ cut})\left(\frac{752 \text{ in}}{\text{cut}}\right)(0.512 \text{ in width}) = 385.02 \text{ in}^2$$

The fugitive source PTE will be calculated as follows:

$$= \frac{(\text{Inventory from Table 11, Ci})(\text{Saw Cut Area, } 385.02 \text{ in}^2)(\text{RF of } 1\text{E} - 03)}{(\text{Duration of Activity, 5 years})(\text{Total Area of Walls, } 135{,}360 \text{ in}^2)}$$

The PTE for saw cuts are shown in Table 13. It should be noted that the C Cell floor inventory was intentionally not included and is considered to have no PTE because it will not be affected by saw cuts.

Table 13 - C Cell Fugitive Source PTE

A	B
Nuclide	**PTE (Ci/year)**
Co-60	3.93E-12
Se-79	3.03E-13
Sr-90	2.66E-07
Y-90	2.66E-07
Tc-99	1.01E-11
Sb-125	
Te-125m	
Cs-134	
Cs-137	5.11E-07
Ba-137m	4.83E-07
Eu-154	2.21E-10
Eu-155	3.09E-11
Pu-238	2.36E-10
Pu-239	8.87E-11
Pu-240	8.80E-11
Pu-241	1.18E-09
Pu-242	1.46E-13
Am-241	1.33E-09
Cm-243	4.32E-12
Cm-244	2.01E-10

3.4 D Cell (REC)

D Cell has internal floor dimensions of 13 ft (156 in) by 21 ft (252 in) (per H-3-20166) with an internal cell height of 16 ft (192 in) (per H-3-20213). D Cell is sometimes referred to as the “Mechanical Cell” in historical documents and drawings.

Fixative will be applied to D Cell surfaces prior to stabilization and shutdown of the facility’s ventilation system. D Cell will be grouted after shut down of the facility’s ventilation system. As discussed in Section 3.3, no saw cuts will be performed through D Cell. No fugitive source PTE will occur.

3.4.1 Inventory

The D Cell residual contamination inventory was obtained from Table 29 of WCH, 2010a and decay corrected using RadCalc. The RadCalc software run showing the starting inventory and decayed inventory are shown in Attachment J. Radioactive decay of this inventory was performed with RadCalc from 1/1/10 to 1/1/26. Decayed radionuclide inventories less than 1E-08 Ci were not included. Daughter products shown in the RadCalc decayed radionuclide inventory (e.g., Pa-233, U-234, U-235m, U-237, and Np-237) were not included because they do not contribute significantly to the TEDE. The decayed inventory is shown in Table 14.

Table 14 - D Cell Residual Contamination

A	B
Nuclide	**Inventory (Ci)**
Co-60	4.35E-03
Se-79	2.07E-05
Sr-90	1.51E+01
Y-90	1.51E+01
Tc-99	6.86E-04
Sb-125	
Te-125m	
Cs-134	4.00E-06
Cs-137	7.74E+01
Ba-137m	7.31E+01
Eu-154	9.35E-02
Eu-155	
Pu-238	1.60E-02
Pu-239	8.12E-03
Pu-240	8.25E-03
Pu-241	1.08E-01
Pu-242	1.33E-05
Am-241	9.34E-02
Cm-243	1.35E-03
Cm-244	6.21E-02

3.4.2 Release Fraction

Current in-cell conditions, per WCH, 2010a, establish the ratio of fixed contamination to removable contamination in the REC Cells as 30-to-1. As such, removable and fixed contamination fractions are 1 part in 31 and 30 parts in 31 of the affected inventory, respectively. Removable contamination will apply a RF of 1E-03 (consistent with particulates in WAC 246-247) and fixed contamination will apply a RF of 1E-06 (consistent with solids in WAC 246-247).

3.4.3 Point Source PTE

Consistent with WAC 246-247, removable contamination will apply a RF of 1E-03 (consistent with particulates) and fixed contamination will apply a RF of 1E-06 (consistent with solids) for the walls and floor. Point source emission activities will occur over two years. Table 15 calculates the point source PTE for the D Cell. The PTE for each nuclide was calculated as follows:

$$= \frac{(\text{D Cell Inventory, Ci})(\text{RF of } 1\text{E}-03)(\text{Fraction of Removable Contamination}, 1/31)}{\text{Duration of Activity, 2 years}}$$

$$+ \frac{(\text{D Cell Inventory, Ci})(\text{RF of } 1\text{E}-06)(\text{Fraction of Fixed Contamination}, 30/31)}{\text{Duration of Activity, 2 years}}$$

Table 15 – D Cell Point Source PTE

A	B
Nuclide	**PTE (Ci/yr)**
Co-60	7.23E-08
Se-79	3.44E-10
Sr-90	2.51E-04
Y-90	2.51E-04
Tc-99	1.14E-08
Sb-125	
Te-125m	
Cs-134	6.64E-11
Cs-137	1.29E-03
Ba-137m	1.21E-03
Eu-154	1.55E-06
Eu-155	
Pu-238	2.65E-07
Pu-239	1.35E-07
Pu-240	1.37E-07
Pu-241	1.79E-06
Pu-242	2.21E-10
Am-241	1.55E-06
Cm-243	2.24E-08
Cm-244	1.03E-06

3.4.4 Fugitive Source PTE

As mentioned in Section 3.4, no fugitive source PTE from the D Cell will occur. Table 16 not used.

3.5 REC Airlock

The REC Airlock Cell has internal floor dimensions of 22 ft (264 in) in the north/south axis by 21ft 6in (258 in) in the east/west axis (per H-3-20160) with an internal cell height of 33 ft (396 in) (per H-3-20213). The REC Pipe Trench is located adjacent to the west wall and under cover blocks installed in the floor of the Airlock Cell and runs in the north-south direction. The Airlock Trench is located in the airlock floor immediately east of the cover blocks and drains into the REC Pipe Trench. Fixative will be applied to all surfaces within the REC Airlock prior to shut down of the facility's ventilation system. Saw cutting activities will be performed during the fugitive source emissions phase.

3.5.1 REC Airlock Cell

3.5.1.1 Inventory

The inventory from the REC Airlock Cell floor, ceiling, and walls were obtained from Table 30 of WCH, 2010a and decay corrected using RadCalc. The RadCalc software run showing the starting inventory and decayed inventory are shown in Attachment K. Radioactive decay of this inventory was performed with RadCalc from 1/1/10 to 1/1/26. Decayed radionuclide inventories less than 1E-08 Ci were not included. Daughter products shown in the RadCalc decayed radionuclide inventory (e.g., Pa-233, U-234, U-235m, U-237, and Np-237) were not included because they do not contribute significantly to the TEDE. The decayed inventory is shown in Table 17. The REC Pipe Trench is addressed separately in Section 3.5.2.

Table 17 – REC Airlock Cell Residual Contamination

A	B	C	D	E
Nuclide	**Floor (Ci)**	**North and South Walls (Ci)**	**East and West Walls (Ci)**	**Ceiling (Ci)**
Co-60	2.48E-05	1.43E-05	4.96E-06	7.78E-06
Se-79	1.21E-06	6.97E-07	2.42E-07	3.79E-07
Sr-90	1.16E+00	6.67E-01	2.31E-01	3.63E-01
Y-90	1.16E+00	6.67E-01	2.31E-01	3.63E-01
Tc-99	4.02E-05	2.32E-05	8.05E-06	1.26E-05
Sb-125				
Te-125m				
Cs-134				
Cs-137	2.20E+00	1.27E+00	4.40E-01	6.91E-01
Ba-137m	2.08E+00	1.19E+00	4.16E-01	6.52E-01
Eu-154	1.16E-03	6.69E-04	2.32E-04	3.63E-04
Eu-155	2.01E-04	1.15E-04	4.02E-05	6.30E-05
Pu-238	9.69E-04	5.58E-04	1.93E-04	3.03E-04
Pu-239	3.53E-04	2.04E-04	7.07E-05	1.11E-04
Pu-240	3.51E-04	2.02E-04	7.01E-05	1.10E-04
Pu-241	5.54E-03	3.21E-03	1.11E-03	1.74E-03
Pu-242	5.79E-07	3.34E-07	1.16E-07	1.82E-07
Am-241	5.31E-03	3.06E-03	1.07E-03	1.67E-03
Cm-243	1.88E-05	1.09E-05	3.77E-06	5.91E-06
Cm-244	9.13E-04	5.28E-04	1.83E-04	2.87E-04

3.5.1.2 Release Fraction

Contaminated surface areas within the cell will be coated with fixative prior to saw cutting activities. The fixative will be designed to fix in place surface contamination and eliminate potential for emissions during rigging operations, packaging and transportation offsite. Current in-cell conditions (prior to fixative application), per WCH, 2010a, establish the ratio of fixed contamination to removable

contamination in the REC Cells as 30-to-1. As such, removable and fixed contamination fractions are 1 part in 31 and 30 parts in 31 of the affected inventory, respectively. Additional fixative may be applied to wall surfaces after removal from the facility prior to packaging and transportation offsite. Removable contamination will apply a RF of 1E-03 (consistent with particulates in WAC 246-247) and fixed contamination will apply a RF of 1E-06 (consistent with solids in WAC 246-247).

Consistent with WAC 246-247, a RF of 1E-03 will be applied to the inventory that will be disturbed by saw cutting activities and is assumed to all be in the form of particulate. Saw cutting activities will use water to control dust and for cooling of the cutting mechanism.

3.5.1.3 Point Source PTE

Point source emission activities will occur over two years. Table 18 calculates the point source PTE for the Airlock REC Cell. The PTE for each nuclide was calculated as follows:

$$= \frac{(\text{Walls, Ceiling, and Floor Inventory, Ci})(\text{RF of } 1\text{E}-03)(\text{Fraction of Removable Contamination, } 1/31)}{\text{Duration of Activity, 2 years}}$$

$$+ \frac{(\text{Walls, Ceiling, and Floor Inventory, Ci})(\text{RF of } 1\text{E}-06)(\text{Fraction of Fixed Contamination, } 30/31)}{\text{Duration of Activity, 2 years}}$$

Table 18 – REC Airlock Cell Point Source PTE

A	B
Nuclide	**PTE (Ci/yr)**
Co-60	8.60E-10
Se-79	4.20E-11
Sr-90	4.02E-05
Y-90	4.02E-05
Tc-99	1.40E-09
Sb-125	
Te-125m	
Cs-134	
Cs-137	7.63E-05
Ba-137m	7.20E-05
Eu-154	4.02E-08
Eu-155	6.97E-09
Pu-238	3.36E-08
Pu-239	1.23E-08
Pu-240	1.22E-08
Pu-241	1.93E-07
Pu-242	2.01E-11
Am-241	1.84E-07
Cm-243	6.53E-10
Cm-244	3.18E-08

3.5.1.4 Fugitive Source PTE

After the facility's ventilation system is shut down, the Airlock Cell will be dismantled with a diamond wire saw. Diamond wire widths of 10mm (0.394 in) – 13mm (0.512 in) will be used. The saw kerf width of 0.512 inches will conservatively be used for all cuts. Fugitive source emissions will occur over 5 years.

Saw cuts will be calculated for each of the inventories, 1) ceiling, 2) floor, 3) north and south walls, and 4) the east and west walls. The total areas for these four areas are calculated as follows.

$$\text{Ceiling} = (264\text{ in})(258\text{ in}) = 68{,}112\text{ in}^2$$

$$\text{Floor} = (264\text{ in})(258\text{ in}) = 68{,}112\text{ in}^2$$

$$\text{North and South Walls} = (258\text{ in})(396\text{ in})(2\text{ walls}) = 204{,}336\text{ in}^2$$

$$\text{East and West Walls} = (264\text{ in})(396\text{ in})(2\text{ walls}) = 209{,}088\text{ in}^2$$

The number of saw cuts assumed were developed based on the number of cuts to facilitate ease of waste shipment. The number of cuts are considered very conservative in that the north and south

walls of Airlock Cell will most likely to not receive as many cuts, given that they will serve as the outside of the A, C, and D Cell monoliths.

- The ceiling is assumed to be segmented by making 5 east/west cuts with a length of 21.5 feet and 3 north/south cuts with a length of 22 feet.
- The floor will be segmented by making 5 east/west cuts with a length of 21.5 feet and 3 north/south cuts with a length of 22 feet.
- The north and south 21.5 feet x 33 feet walls will be segmented by making a total of 10 horizontal cuts with a length of 21.5 feet and 4 vertical cuts with a length of 33 feet between the two walls.
- The east and west 22 feet x 33 feet walls will be segmented by making a total of 10 horizontal cuts with a length of 22 feet and 4 vertical cuts with a length of 33 feet between the two walls.

The area affected by saw cuts are calculated as follows.

$$\text{Ceiling} = (5\text{ cuts})\left(\frac{258\text{ in}}{\text{cut}}\right)(0.512\text{ in width}) + (3\text{ cuts})\left(\frac{264\text{ in}}{\text{cut}}\right)(0.512\text{ in width}) = 1{,}066\text{ in}^2$$

$$\text{Floor} = (5\text{ cuts})\left(\frac{258\text{ in}}{\text{cut}}\right)(0.512\text{ in width}) + (3\text{ cuts})\left(\frac{264\text{ in}}{\text{cut}}\right)(0.512\text{ in width}) = 1{,}066\text{ in}^2$$

$$\text{North and South Walls} = (10\text{ horizontal cuts})\left(\frac{258\text{ in}}{\text{cut}}\right)(0.512\text{ in width}) + (4\text{ vertical cuts})\left(\frac{396\text{ in}}{\text{cut}}\right)(0.512\text{ in width}) = 2{,}132\text{ in}^2$$

$$\text{East and West Walls} = (10\text{ horizontal cuts})\left(\frac{264\text{ in}}{\text{cut}}\right)(0.512\text{ in width}) + (4\text{ vertical cuts})\left(\frac{396\text{ in}}{\text{cut}}\right)(0.512\text{ in width}) = 2{,}163\text{ in}^2$$

The fugitive source PTE for saw cuts will be calculated as follows:

$$= \frac{(\text{Inventory from Table 17, Ci})(\text{Area Saw Cut, in}^2)(\text{RF of 1E} - 03)}{(\text{Total Surface Area, in}^2)(\text{Duration of Activity, 5 years})}$$

The PTE for saw cuts are shown in Table 19.

For areas which will not be affected by saw cuts, the PTE will be calculated as follows and is labeled as “General Fixed/Removable Contamination”.

$$= \frac{(\text{Inventory from Table 17, Ci})(\text{RF of 1E} - 03)(\text{Fraction of Removable Contamination}, 1/31)}{\text{Duration of Activity, 5 years}}$$

$$+ \frac{(\text{Inventory from Table 17, Ci})(\text{RF of 1E} - 06)(\text{Fraction of Fixed Contamination}, 30/31)}{\text{Duration of Activity, 5 years}}$$

Table 19 – REC Airlock Cell Fugitive Source PTE

A	B	C	D	E	F	G
Nuclide	Ceiling Cuts (Ci/year)	Floor Cuts (Ci/year)	N-S Wall Cuts (Ci/year)	E-W Wall Cuts (Ci/year)	General Fixed/Removable Contamination (Ci/year)	Total PTE (Ci/year)
Co-60	2.44E-11	7.75E-11	2.98E-11	1.03E-11	3.44E-10	4.86E-10
Se-79	1.19E-12	3.79E-12	1.45E-12	5.01E-13	1.68E-11	2.37E-11
Sr-90	1.13E-06	3.62E-06	1.39E-06	4.78E-07	1.61E-05	2.27E-05
Y-90	1.14E-06	3.62E-06	1.39E-06	4.79E-07	1.61E-05	2.27E-05
Tc-99	3.94E-11	1.26E-10	4.84E-11	1.67E-11	5.59E-10	7.89E-10
Sb-125						
Te-125m						
Cs-134						
Cs-137	2.16E-06	6.88E-06	2.64E-06	9.11E-07	3.05E-05	4.31E-05
Ba-137m	2.04E-06	6.49E-06	2.49E-06	8.60E-07	2.88E-05	4.07E-05
Eu-154	1.14E-09	3.62E-09	1.39E-09	4.80E-10	1.61E-08	2.27E-08
Eu-155	1.97E-10	6.28E-10	2.41E-10	8.32E-11	2.79E-09	3.94E-09
Pu-238	9.49E-10	3.03E-09	1.16E-09	3.99E-10	1.34E-08	1.90E-08
Pu-239	3.47E-10	1.10E-09	4.25E-10	1.46E-10	4.91E-09	6.93E-09
Pu-240	3.43E-10	1.10E-09	4.21E-10	1.45E-10	4.86E-09	6.87E-09
Pu-241	5.46E-09	1.73E-08	6.69E-09	2.30E-09	7.71E-08	1.09E-07
Pu-242	5.70E-13	1.81E-12	6.97E-13	2.40E-13	8.05E-12	1.14E-11
Am-241	5.21E-09	1.66E-08	6.38E-09	2.21E-09	7.37E-08	1.04E-07
Cm-243	1.85E-11	5.88E-11	2.26E-11	7.81E-12	2.61E-10	3.69E-10
Cm-244	8.99E-10	2.86E-09	1.10E-09	3.79E-10	1.27E-08	1.79E-08

3.5.2 REC Pipe Trench

3.5.2.1 Inventory

The inventory from the REC Pipe Trench floor and walls were obtained from Table 31 of WCH, 2010a and decay corrected using RadCalc. The RadCalc software run showing the starting inventory and decayed inventory are shown in Attachment L. Radioactive decay of this inventory was performed with RadCalc from 1/1/10 to 1/1/26. Decayed radionuclide inventories less than 1E-08 Ci were not included. Daughter products shown in the RadCalc decayed radionuclide inventory (e.g., Pa-233, U-234, U-235m, U-237, and Np-237) were not included because they do not contribute significantly to the TEDE. The decayed inventory is shown in Table 20.

Table 20 – REC Pipe Trench Inventory

A	B	C	D
Nuclide	Floor (Ci)	North & South Walls (Ci)	East & West Walls (Ci)
Co-60	4.07E-04	7.45E-05	1.14E-04
Se-79	3.15E-05	5.76E-06	8.77E-06
Sr-90	2.76E+01	5.05E+00	7.69E+00
Y-90	2.76E+01	5.05E+00	7.69E+00
Tc-99	1.05E-03	1.92E-04	2.92E-04
Sb-125			
Te-125m			
Cs-134			
Cs-137	5.30E+01	9.68E+00	1.47E+01
Ba-137m	5.00E+01	9.14E+00	1.39E+01
Eu-154	2.29E-02	4.21E-03	6.41E-03
Eu-155	3.21E-03	5.87E-04	8.95E-04
Pu-238	2.45E-02	4.48E-03	6.83E-03
Pu-239	9.21E-03	1.69E-03	2.57E-03
Pu-240	9.11E-03	1.67E-03	2.55E-03
Pu-241	1.23E-01	2.25E-02	3.42E-02
Pu-242	1.51E-05	2.77E-06	4.21E-06
Am-241	1.38E-01	2.52E-02	3.85E-02
Cm-243	4.50E-04	8.22E-05	1.26E-04
Cm-244	2.09E-02	3.81E-03	5.83E-03

3.5.2.2 Release Fraction

Contaminated surface areas within the REC Pipe Trench will be coated with fixative prior to saw cutting activities. The fixative will be designed to fix in place surface contamination and eliminate potential for emissions during rigging operations, packaging and transportation offsite. Current in-cell conditions (prior to fixative application), per WCH, 2010a, establish the ratio of fixed contamination to removable contamination in the REC Cells as 30-to-1. As such, removable and fixed contamination fractions are 1 part in 31 and 30 parts in 31 of the affected inventory, respectively. Additional fixative may be applied to wall surfaces after removal from the facility prior to packaging and transportation offsite. Removable contamination will apply a RF of 1E-03 (consistent with particulates in WAC 246-247) and fixed contamination will apply a RF of 1E-06 (consistent with solids in WAC 246-247).

Consistent with WAC 246-247, a RF of 1E-03 will be applied to the inventory that will be disturbed by saw cutting activities and is assumed to all be in the form of particulate. Saw cutting activities will use water to control dust and for cooling of the cutting mechanism.

3.5.2.3 Point Source PTE

Point source emission activities will occur over two years. Table 21 calculates the point source PTE for the REC Pipe Trench. The PTE for each nuclide was calculated as follows:

$$= \frac{(\text{Wall and Floor Inventory from Table 20, Ci})(\text{RF of 1E} - 03)(\text{Fraction of Removable Contamination, 1/31})}{\text{Duration of Activity, 2 years}}$$

$$+ \frac{(\text{Wall and Floor Inventory from Table 20, Ci})(\text{RF of 1E} - 06)(\text{Fraction of Fixed Contamination, 30/31})}{\text{Duration of Activity, 2 years}}$$

Table 21 – REC Pipe Trench Point Source PTE

A	B
Nuclide	**PTE (Ci/yr)**
Co-60	9.89E-09
Se-79	7.65E-10
Sr-90	6.70E-04
Y-90	6.71E-04
Tc-99	2.55E-08
Sb-125	
Te-125m	
Cs-134	
Cs-137	1.28E-03
Ba-137m	1.21E-03
Eu-154	5.57E-07
Eu-155	7.79E-08
Pu-238	5.95E-07
Pu-239	2.24E-07
Pu-240	2.21E-07
Pu-241	2.98E-06
Pu-242	3.67E-10
Am-241	3.36E-06
Cm-243	1.09E-08
Cm-244	5.07E-07

3.5.2.4 Fugitive Source PTE

After the facility's ventilation system is shut down, the REC Pipe Trench will be dismantled with a diamond wire saw. Diamond wire widths of 10mm (0.394 in) – 13mm (0.512 in) will be used. The saw kerf width of 0.512 inches will conservatively be used for all cuts. Fugitive source emissions will occur over 5 years. The REC Pipe Trench is nominally 49 inches (east-west) by 258 inches (north-south) by 91 inches deep (Drawings H-3-20213 and H-3-20273). As shown in H-3-20213, the floor of the trench slopes from an elevation of -7'2" to -8', therefore the average depth of the trench would be 7'7" (or 91" in depth, including the cover blocks).

Saw cuts will be calculated for each of the inventories, 1) the floor 2) north and south walls, and 3) the east and west walls. The total areas for these three areas are calculated as follows.

$$\text{Floor} = (49\text{ in})(258\text{ in}) = 12{,}642\text{ in}^2$$

$$\text{North and South Walls} = (49\text{ in})(91\text{ in})(2\text{ walls}) = 8{,}918\text{ in}^2$$

$$\text{East and West Walls} = (258\text{ in})(91\text{ in})(2\text{ walls}) = 46{,}956\text{ in}^2$$

The number of saws cuts assumed were developed based on number of cuts to facilitate ease of waste shipment. The number of cuts are considered conservative.

The trench will be stabilized with grout and cut into 6 blocks. This will entail the following cuts:

- 3 vertical cuts through the floor with a length of 49 inches are assumed
- 1 horizontal cut through the south wall and 1 horizontal cut through the north wall with each cut being 49 inches in length
- 1 horizontal cut through the east wall and 1 horizontal cut through the west wall with each cut being 258 inches in length
- 3 vertical cuts through the east wall and 3 vertical cuts through the west wall with each cut being 91 inches in length

The area affected by saw cuts are calculated as follows.

$$\text{Floor} = (3\text{ cuts})\left(\frac{49\text{ in}}{\text{cut}}\right)(0.512\text{ in width}) = 75.3\text{ in}^2$$

$$\text{North and South Walls} = (2\text{ horizontal cuts})\left(\frac{49\text{ in}}{\text{cut}}\right)(0.512\text{ in width}) + (0\text{ vertical cuts}) = 50.2\text{ in}^2$$

$$\text{East and West Walls} = (2\text{ horizontal cuts})\left(\frac{258\text{ in}}{\text{cut}}\right)(0.512\text{ in width}) + (6\text{ vertical cuts})\left(\frac{91\text{ in}}{\text{cut}}\right)(0.512\text{ in width}) = 543.7\text{in}^2$$

The fugitive source PTE for cuts will be calculated as follows:

$$= \frac{(\text{Inventory from Table 20, Ci})(\text{Area Saw Cut, in}^2)(\text{RFof 1E} - 03)}{(\text{Total Surface Area, in}^2)(\text{Duration of Activity, 5 years})}$$

The PTE for saw cuts are shown in Table 22.

For areas which will not be affected by saw cuts, the PTE will be calculated as follows and is labeled as “General Fixed/Removable Contamination”.

$$= \frac{(\text{Inventory from Table 20, Ci})(\text{RF of 1E} - 03)(\text{Fraction of Removable Contamination, 1/31})}{\text{Duration of Activity, 5 years}}$$

$$+\frac{(\text{Inventory from Table 20, Ci})(\text{RF of 1E}-06)(\text{Fraction of Fixed Contamination, 30/31})}{\text{Duration of Activity, 5 years}}$$

Table 22 – REC Pipe Trench Fugitive Source PTE

A	B	C	D	E	F
Nuclide	**Floor cuts (Ci/year)**	**N-S Wall cuts (Ci/year)**	**E-W Wall cuts (Ci/year)**	**General Fixed/Removable (Ci/year)**	**Total PTE (Ci/year)**
Co-60	4.85E-10	8.39E-11	2.63E-10	3.96E-09	4.79E-09
Se-79	3.75E-11	6.48E-12	2.03E-11	3.06E-10	3.70E-10
Sr-90	3.29E-05	5.68E-06	1.78E-05	2.68E-04	3.25E-04
Y-90	3.29E-05	5.68E-06	1.78E-05	2.68E-04	3.25E-04
Tc-99	1.25E-09	2.16E-10	6.76E-10	1.02E-08	1.23E-08
Sb-125					
Te-125m					
Cs-134					
Cs-137	6.30E-05	1.09E-05	3.41E-05	5.14E-04	6.22E-04
Ba-137m	5.95E-05	1.03E-05	3.22E-05	4.85E-04	5.87E-04
Eu-154	2.73E-08	4.74E-09	1.48E-08	2.23E-07	2.70E-07
Eu-155	3.82E-09	6.60E-10	2.07E-09	3.12E-08	3.77E-08
Pu-238	2.92E-08	5.04E-09	1.58E-08	2.38E-07	2.88E-07
Pu-239	1.10E-08	1.90E-09	5.95E-09	8.95E-08	1.08E-07
Pu-240	1.09E-08	1.87E-09	5.90E-09	8.86E-08	1.07E-07
Pu-241	1.46E-07	2.53E-08	7.93E-08	1.19E-06	1.44E-06
Pu-242	1.80E-11	3.12E-12	9.75E-12	1.47E-10	1.78E-10
Am-241	1.65E-07	2.84E-08	8.93E-08	1.34E-06	1.62E-06
Cm-243	5.36E-10	9.25E-11	2.91E-10	4.37E-09	5.29E-09
Cm-244	2.48E-08	4.29E-09	1.35E-08	2.03E-07	2.45E-07

3.6 Shielded Materials Facility (SMF)

The SMF consists of a south cell, east cell, and an airlock cell. The large majority of radiological inventory is present in the south cell, with a small inventory in the east cell and airlock cell. During grouting activities in the SMF South Cell in 2010, grout caused some contamination to move into the SMF East Cell and SMF Airlock via the floor drain system. Section 3.6.1, 3.6.2, and 3.6.3 calculate the PTE for the south cell, east cell, and airlock respectively.

The nuclide distributions used for the SMF South Cell, East Cell and Airlock are known to be conservative. Given the operational history, Sr-90 and transuranics are largely over reported. This is documented in WCH, 2009a.

3.6.1 SMF South Cell

The SMF South Cell has internal floor dimensions of 16 ft (192 in) by 50 ft (600 in) (per H-3-20162) with an internal cell height of 18 ft (216 in) (per H-3-20211). The south cell will be cut into five monoliths (Monoliths 15, 16, 17, 18, 19) as shown in Attachment A of WCH, 2011b.

Except for compartment 1, SMF South Cell contamination has been stabilized with grout up to the bottom of the viewing windows. Compartment 1 has been grouted to the top of the viewing windows. The remainder of South Cell has been stabilized with asbestos binding compound (ABC) to the extent possible using manipulators. Grout has encapsulated containers, and discrete items that have been placed on the bottom of the cell, and the majority of contamination that resides on the lower portion of the cell walls and floors. Cell size reduction will be performed by diamond wire saw cutting machinery.

3.6.1.1 Inventory

The inventory from the SMF South Cell walls and ceiling were obtained from Table 24 of *Total Effective Dose Equivalent Calculation for 324 Facility and 300-296 Waste site Remediation*, ECF-324-BLDG-17-0086, Revision 0 (CHPRC 2017). Table 23, Columns A through F, are totaled in Column G and decay corrected using RadCalc. The RadCalc software run showing the starting inventory and decayed inventory are shown in Attachment M. Radioactive decay of this inventory was performed with RadCalc from 1/1/10 to 1/1/26. Decayed radionuclide inventories less than 1E-08 Ci were not included. Daughter products shown in the RadCalc decayed radionuclide inventory (e.g., Pa-233, U-234, U-235m, U-237, and Np-237) were not included because they do not contribute significantly to the TEDE. The decayed inventory is shown in Column H of Table 23. The floor has been grouted, therefore no point source PTE will occur.

Y-90 is in equilibrium with its parent nuclide Sr-90; therefore, the value of Sr-90 is equal to Y-90. Ba-137m, a daughter product to Cs-137, is at a ratio of 0.946 to that of Cs-137.

Table 23 – SMF South Cell Inventory

A	B	C	D	E	F	G	H
Nuclide	**Floor (Ci)**	**North Wall (Ci)**	**South Wall (Ci)**	**East Wall (Ci)**	**West Wall (Ci)**	**Ceiling (Ci)**	**Total Inventory (Ci)**
Co-60	5.76E-04	3.51E-04	4.94E-04	9.45E-04	6.79E-04	1.07E-03	4.11E-03
Se-79							
Sr-90	3.35E-03	2.04E-03	2.87E-03	5.50E-03	3.95E-03	6.22E-03	2.39E-02
Y-90	3.35E-03	2.04E-03	2.87E-03	5.51E-03	3.95E-03	6.22E-03	2.39E-02
Tc-99							
Sb-125	9.98E-04	6.08E-04	8.56E-04	1.64E-03	1.18E-03	1.85E-03	7.13E-03
Te-125m	2.37E-04	1.44E-04	2.03E-04	3.89E-04	2.79E-04	4.39E-04	1.69E-03
Cs-134	2.53E-07	1.54E-07	2.17E-07	4.16E-07	2.98E-07	4.70E-07	1.81E-06
Cs-137	1.42E-01	8.64E-02	1.22E-01	2.33E-01	1.67E-01	2.63E-01	1.01E+00
Ba-137m	1.34E-01	8.16E-02	1.15E-01	2.20E-01	1.58E-01	2.49E-01	9.57E-01
Eu-154	7.35E-05	4.48E-05	6.30E-05	1.21E-04	8.67E-05	1.36E-04	5.25E-04
Eu-155	2.59E-05	1.58E-05	2.22E-05	4.25E-05	3.06E-05	4.80E-05	1.85E-04
Pu-238	2.08E-06	1.27E-06	1.78E-06	3.42E-06	2.45E-06	3.86E-06	1.49E-05
Pu-239	7.79E-07	4.75E-07	6.69E-07	1.28E-06	9.20E-07	1.45E-06	5.57E-06
Pu-240	7.72E-07	4.71E-07	6.62E-07	1.27E-06	9.11E-07	1.44E-06	5.52E-06
Pu-241	1.04E-05	6.37E-06	8.95E-06	1.71E-05	1.23E-05	1.93E-05	7.44E-05
Pu-242							
Am-241	2.72E-05	1.66E-05	2.33E-05	4.47E-05	3.21E-05	5.05E-05	1.94E-04
Cm-243	3.79E-08	2.32E-08	3.26E-08	6.24E-08	4.48E-08	7.05E-08	2.71E-07
Cm-244	1.76E-06	1.08E-06	1.51E-06	2.90E-06	2.08E-06	3.27E-06	1.26E-05

3.6.1.2 Release Fraction

Given that the entire floor of the south cell has been stabilized with grout, no PTE is calculated from the floor inventory for the point source phase. ABC fixative has been applied to ceiling of the cell and the inventory in Compartment 1 has been stabilized, therefore, all of the inventory during the point source phase of the project is assumed to have a release fraction consistent with solids (a release fraction of 1E-06).

Consistent with WAC 246-247, a RF of 1E-03 will be applied to the inventory that will be disturbed by saw cutting activities and is assumed to all be in the form of particulate. Saw cutting activities will use water to control dust and for cooling of the cutting mechanism. Inventory which has been completely encapsulated in grout will have no PTE.

3.6.1.3 Point Source PTE

The PTE for each radionuclide is calculated as follows:

$$= \frac{(\text{Inventory from Column H of Table 23, Ci})(\text{RF of 1E} - 06)}{\text{Duration of Activity, 2 years}}$$

The point source PTE is shown in Table 24.

Table 24 – SMF South Cell Point Source PTE

A	B
Nuclide	**PTE (yr)**
Co-60	2.06E-09
Se-79	
Sr-90	1.20E-08
Y-90	1.20E-08
Tc-99	
Sb-125	3.56E-09
Te-125m	8.46E-10
Cs-134	9.04E-13
Cs-137	5.07E-07
Ba-137m	4.78E-07
Eu-154	2.62E-10
Eu-155	9.25E-11
Pu-238	7.43E-12
Pu-239	2.78E-12
Pu-240	2.76E-12
Pu-241	3.72E-11
Pu-242	
Am-241	9.72E-11
Cm-243	1.36E-13
Cm-244	6.30E-12

3.6.1.4 Fugitive Source PTE

After the facility's ventilation system is shut down, the SMF South Cell will be dismantled with a diamond wire saw. Diamond wire widths of 10mm (0.394 in) – 13mm (0.512 in) will be used. The saw kerf width of 0.512 inches will conservatively be used for all cuts. Fugitive source emissions will occur over 5 years.

The SMF South Cell has internal floor dimensions of 16 ft (192 in) by 50 ft (600 in) (per H-3-20162) with an internal cell height of 18 ft (216 in) (per H-3-20211). The south cell will be cut into five monoliths (Monoliths 15, 16, 17, 18, 19) as shown in Attachment A of WCH, 2011b.

Saw cuts will be calculated for each of the inventories, 1) floor, 2) north wall, 3) south wall, 4) east wall, 5) west wall, and 6) ceiling. The total areas of these 6 areas are calculated below.

$$\text{Floor and Ceiling} = (600\text{ in})(192\text{ in}) = 115{,}200\text{ in}^2$$

$$\text{North and South Walls} = (216\text{ in})(192\text{ in}) = 41{,}472\text{ in}^2$$

$$\text{East and West Walls} = (600\text{ in})(216\text{ in}) = 129{,}600\text{ in}^2$$

The following summarizes the affected cut area for each of the six areas:

Two cuts (24 and 28) will be performed on the floor:

$$= (2\text{ cuts})(\text{Kerf Width}, 0.512\text{ in})(192\text{ in/cut}) = 196.6\text{ in}^2$$

One cut (26) will be performed on the north wall:

$$= (1\text{ cut})(\text{Kerf Width}, 0.512\text{ in})(192\text{ in/cut}) = 98.3\text{ in}^2$$

One cut (25) will be performed on the south wall:

$$= (1\text{ cut})(\text{Kerf Width}, 0.512\text{ in})(192\text{ in/cut}) = 98.3\text{ in}^2$$

Four cuts will be performed on the east wall. Cuts 24 and 28 will be vertical cuts, each conservatively assumed to be the full height of the cell (216 in). Cuts 25 and 26 combined will have a length of 600 in:

$$= (2\text{ cuts})(\text{Kerf Width}, 0.512\text{ in})(216\text{ in/cut}) + (1\text{ cut})(\text{Kerf Width}, 0.512\text{ in})(600\text{ in/cut}) = 528.4\text{ in}^2$$

Four cuts will be performed on the west wall. Cuts 24 and 28 will be vertical cuts, each conservatively assumed to be the full height of the cell (216 in). Cuts 25 and 26 combined will have a length of 600 in:

$$= (2\text{ cuts})(\text{Kerf Width}, 0.512\text{ in})(216\text{ in/cut}) + (1\text{ cut})(\text{Kerf Width}, 0.512\text{ in})(600\text{ in/cut}) = 528.4\text{ in}^2$$

One cut (24) will be performed on the ceiling:

$$= (1\text{ cut})(\text{Kerf Width}, 0.512\text{ in})(192\text{ in/cut}) = 98.3\text{ in}^2$$

The fugitive source PTE will be calculated as follows:

$$= \frac{(\text{Surface Inventory, Ci})(\text{Area Saw Cut, in}^2)(\text{RF of 1E} - 03)}{(\text{Total Surface Area, in}^2)(\text{Duration of Activity, 5 years})}$$

The PTE for saw cuts are shown below in Columns B through G of Table 26. Table 25 is not used. Column H of Table 26 provides the sum of fugitive emissions from saw cuts (Columns B through G).

Table 26. SMF South Cell Fugitive Source PTE

A	B	C	D	E	F	G	H	I
Nuclide	Floor (Ci/yr)	North Wall (Ci/yr)	South Wall (Ci/yr)	East Wall (Ci/yr)	West Wall (Ci/yr)	Ceiling (Ci/yr)	General Fixed/Smearable Contamination (Ci/yr)	Total (Ci/yr)
Co-60	1.97E-10	1.67E-10	2.34E-10	7.71E-10	5.54E-10	1.82E-10	2.03E-08	2.24E-08
Se-79								
Sr-90	1.14E-09	9.68E-10	1.36E-09	4.49E-09	3.22E-09	1.06E-09	1.18E-07	1.30E-07
Y-90	1.14E-09	9.68E-10	1.36E-09	4.49E-09	3.22E-09	1.06E-09	1.18E-07	1.31E-07
Tc-99								
Sb-125	3.41E-10	2.88E-10	4.06E-10	1.34E-09	9.60E-10	3.16E-10	3.52E-08	3.88E-08
Te-125m	8.08E-11	6.85E-11	9.63E-11	3.17E-10	2.28E-10	7.49E-11	8.35E-09	9.22E-09
Cs-134	8.62E-14	7.30E-14	1.03E-13	3.39E-13	2.43E-13	8.02E-14	8.93E-12	9.85E-12
Cs-137	4.84E-08	4.10E-08	5.77E-08	1.90E-07	1.36E-07	4.50E-08	5.01E-06	5.53E-06
Ba-137m	4.57E-08	3.87E-08	5.45E-08	1.79E-07	1.29E-07	4.24E-08	4.73E-06	5.22E-06
Eu-154	2.51E-11	2.13E-11	2.99E-11	9.83E-11	7.07E-11	2.32E-11	2.59E-09	2.86E-09
Eu-155	8.84E-12	7.50E-12	1.05E-11	3.46E-11	2.49E-11	8.19E-12	9.13E-10	1.01E-09
Pu-238	7.10E-13	6.02E-13	8.44E-13	2.79E-12	2.00E-12	6.59E-13	7.34E-11	8.10E-11
Pu-239	2.66E-13	2.25E-13	3.17E-13	1.04E-12	7.50E-13	2.47E-13	2.75E-11	3.04E-11
Pu-240	2.63E-13	2.23E-13	3.14E-13	1.03E-12	7.43E-13	2.45E-13	2.73E-11	3.01E-11
Pu-241	3.56E-12	3.02E-12	4.24E-12	1.40E-11	1.00E-11	3.30E-12	3.68E-10	4.06E-10
Pu-242								
Am-241	9.28E-12	7.88E-12	1.11E-11	3.65E-11	2.61E-11	8.63E-12	9.61E-10	1.06E-09
Cm-243	1.29E-14	1.10E-14	1.55E-14	5.09E-14	3.66E-14	1.20E-14	1.34E-12	1.48E-12
Cm-244	6.01E-13	5.10E-13	7.17E-13	2.36E-12	1.70E-12	5.59E-13	6.22E-11	6.87E-11

3.6.2 SMF East Cell

The SMF East cell has internal floor dimensions of 23 ft (276 in) by 16 ft (192 in) (per H-3-20162) with an internal cell height of 18 ft (216 in) (per H-3-20211). The cell contains low levels of contamination. During core drilling to support grouting of the SMF South Cell in 2010, contaminated water moved into the SMF East Cell through the floor drain system and contaminated the floor of the cell. The contaminated water has been removed and only residual surface contamination remains. Contamination was fixed with asbestos binding compound (ABC). Conventional demolition techniques (e.g. mechanical sheer, thumb, hydraulic hammer, and bucket on heavy equipment) will be used to remove this portion of the structure.

3.6.2.1 Inventory

The inventory for the SMF East Cell was obtained from Table A-4 of TE-WL-17-001-07 and was decay corrected to January 1, 2026. As discussed in TE-WL-17-001-07, only nuclides that contributed >0.01% of radioactivity were retained. The inventory is shown in Table 27.

Table 27 – SMF East Cell Inventory

A	B
Nuclide	**Inventory (Ci)**
Co-60	4.12E-05
Se-79	
Sr-90	2.40E-04
Y-90	2.40E-04
Tc-99	
Sb-125	7.16E-05
Te-125m	1.70E-05
Cs-134	
Cs-137	1.02E-02
Ba-137m	9.59E-03
Eu-154	5.25E-06
Eu-155	1.85E-06
Pu-238	
Pu-239	
Pu-240	
Pu-241	7.47E-07
Pu-242	1.95E-06
Am-241	
Cm-243	
Cm-244	

3.6.2.2 Release Fraction

For point source emissions, a RF of 1E-03 (consistent with particulates) will conservatively be applied, even though contamination has had fixative applied to all surfaces.

Given that the SMF airlock will be demolished using conventional demolition techniques, a RF of 1E-03 (consistent with WAC 246-247) will be applied to the entire inventory for the fugitive source PTE.

3.6.2.3 Point Source PTE

Table 28 calculates the Point Source PTE from activities from the SMF East Cell and is calculated as follows:

$$= \frac{(\text{Inventory from Table 27, Ci})(\text{RF of 1E} - 03)}{\text{Duration of Activity, 2 years}}$$

Table 28 – SMF East Cell Point Source PTE

A	B
Nuclide	**PTE (Ci/yr)**
Co-60	2.06E-08
Se-79	
Sr-90	1.20E-07
Y-90	1.20E-07
Tc-99	
Sb-125	3.58E-08
Te-125m	8.50E-09
Cs-134	
Cs-137	5.10E-06
Ba-137m	4.80E-06
Eu-154	2.63E-09
Eu-155	9.25E-10
Pu-238	
Pu-239	
Pu-240	
Pu-241	3.74E-10
Pu-242	9.75E-10
Am-241	
Cm-243	
Cm-244	

3.6.2.4 Fugitive Source PTE

Table 29 calculates the Fugitive Source PTE from activities from the SMF East Cell and is calculated as follows:

$$= \frac{(\text{Inventory from Table 27, Ci})(\text{RF of 1E} - 03)}{\text{Duration of Activity, 5 years}}$$

Table 29 – SMF East Cell Fugitive Source PTE

A	B
Nuclide	**PTE (Ci/yr)**
Co-60	8.24E-09
Se-79	
Sr-90	4.80E-08
Y-90	4.80E-08
Tc-99	
Sb-125	1.43E-08
Te-125m	3.40E-09
Cs-134	
Cs-137	2.04E-06
Ba-137m	1.92E-06
Eu-154	1.05E-09
Eu-155	3.70E-10
Pu-238	
Pu-239	
Pu-240	
Pu-241	1.49E-10
Pu-242	3.90E-10
Am-241	
Cm-243	
Cm-244	

3.6.3 SMF Airlock

The SMF Airlock cell has internal floor dimensions of 20 ft (240 in) by 16 ft (192 in) (per H-3-20162) with an internal cell height of 18 ft (216 in) (per H-3-20211). The cell contains low levels of contamination. During core drilling to support grouting of the SMF South Cell in 2010, contaminated water moved into the SMF Airlock Cell through the floor drain system and contaminated the floor of the cell. The contaminated water has been removed and only residual surface contamination remains. Some of that contamination has been fixed with ABC and conventional demolition techniques (e.g. mechanical sheer, thumb, hydraulic hammer, and bucket on heavy equipment) will then be used to remove this portion of the structure.

3.6.3.1 Inventory

The inventory for the SMF Airlock was obtained from Table A-4 of TE-WL-17-001-07 and was decay corrected to January 1, 2026. As discussed in TE-WL-17-001-07, only nuclides that contributed >0.01% of radioactivity were retained. The inventory is shown in Table 30.

Table 30 – SMF Airlock Inventory

A	B
Nuclide	**Inventory (Ci)**
Co-60	4.50E-05
Se-79	
Sr-90	2.63E-04
Y-90	2.63E-04
Tc-99	
Sb-125	7.81E-05
Te-125m	1.85E-05
Cs-134	
Cs-137	1.11E-02
Ba-137m	1.05E-02
Eu-154	5.76E-06
Eu-155	2.03E-06
Pu-238	
Pu-239	
Pu-240	
Pu-241	8.15E-07
Pu-242	
Am-241	2.13E-06
Cm-243	
Cm-244	

3.6.3.2 Release Fraction

For point source emissions, a RF of 1E-03 (consistent with particulates) will conservatively be applied, even though contamination has had fixative applied to all surfaces.

Given that the SMF airlock will be demolished using conventional demolition techniques, a RF of 1E-03 (consistent with WAC 246-247) will be applied to the entire inventory for the fugitive source PTE.

3.6.3.3 Point Source PTE

Table 31 calculates the Point Source PTE from activities from the SMF Airlock Cell and is calculated as follows:

$$= \frac{(\text{Inventory from Table 30, Ci})(\text{RF of 1E} - 03)}{\text{Duration of Activity, 2 years}}$$

Table 31 - SMF Airlock Cell Point Source PTE

A	B
Nuclide	**PTE (Ci/yr)**
Co-60	2.25E-08
Se-79	
Sr-90	1.32E-07
Y-90	1.32E-07
Tc-99	
Sb-125	3.91E-08
Te-125m	9.25E-09
Cs-134	
Cs-137	5.55E-06
Ba-137m	5.25E-06
Eu-154	2.88E-09
Eu-155	1.02E-09
Pu-238	
Pu-239	
Pu-240	
Pu-241	4.08E-10
Pu-242	
Am-241	1.07E-09
Cm-243	
Cm-244	

3.6.3.4 Fugitive Source PTE

Table 32 calculates the Fugitive Source PTE from activities from the SMF Airlock Cell and is calculated as follows:

$$= \frac{(\text{Inventory from Table 30, Ci})(\text{RF of 1E} - 03)}{\text{Duration of Activity, 5 years}}$$

Table 32 – SMF Airlock Cell Fugitive Source PTE

A	B
Nuclide	**PTE (Ci/yr)**
Co-60	9.00E-09
Se-79	
Sr-90	5.26E-08
Y-90	5.26E-08
Tc-99	
Sb-125	1.56E-08
Te-125m	3.70E-09
Cs-134	
Cs-137	2.22E-06
Ba-137m	2.10E-06
Eu-154	1.15E-09
Eu-155	4.06E-10
Pu-238	
Pu-239	
Pu-240	
Pu-241	1.63E-10
Pu-242	
Am-241	4.26E-10
Cm-243	
Cm-244	

3.7 High Level Vault (HLV) and Low Level Vault (LLV)

Saw cuts at the outside walls of each of the vaults will be performed. These cuts will have the potential to emit by exposing piping and ductwork that enters or exits the vaults. The systems that will be cut consist of the REC exhaust ductwork, process off gas (POG) and vessel vent (VV) piping, and HLV/LLV process piping, which will be addressed in Sections 3.9, 3.12, and 3.13 respectively.

3.7.1 Inventory

The inventory for the HLV and LLV was obtained from Table A-2 and A-3 of TE-WL-17-001-07 and was decay corrected to January 1, 2026. As discussed in TE-WL-17-001-07, only nuclides that contributed >0.01% of radioactivity were retained. The inventory is shown in Table 33.

Table 33 – HLV/LLV Tanks Inventory

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Nuclide	**T-101 Tank (Ci)**	**T-101 Pot (Ci)**	**T-102 Tank (Ci)**	**T-102 Pot (Ci)**	**T-103 Tank (Ci)**	**T-103 Pot (Ci)**	**T-104 Tank (Ci)**	**T-104 Pot (Ci)**	**T-105 Tank (Ci)**	**T-105 Pot (Ci)**	**T-106 Tank (Ci)**	**T-106 Pot (Ci)**	**T-107 Tank (Ci)**	**T-107 Pot (Ci)**	**T-108 Tank (Ci)**
Mn-54															
Co-60															
Se-79															
Sr-90	2.09E+01	7.89E+00	1.27E+01	4.24E+00	7.55E+01	0.00E+00	6.14E+02	1.47E+02	2.43E+03	1.26E+02	1.82E+02	4.69E+01	2.80E+02	2.21E+01	5.42E+01
Y-90	2.09E+01	7.89E+00	1.27E+01	4.24E+00	7.55E+01	0.00E+00	6.14E+02	1.47E+02	2.43E+03	1.26E+02	1.82E+02	4.70E+01	2.80E+02	2.21E+01	5.42E+01
Tc-99															
Sb-125															
Te-125m															
Cs-134															
Cs-137	4.01E+01	1.51E+01	2.44E+01	8.16E+00	1.45E+02	0.00E+00	1.18E+03	2.81E+02	4.65E+03	2.41E+02	3.48E+02	8.99E+01	5.38E+02	4.23E+01	1.04E+02
Ba-137m	3.79E+01	1.42E+01	2.30E+01	7.70E+00	1.37E+02	0.00E+00	1.11E+03	2.66E+02	4.39E+03	2.28E+02	3.29E+02	8.48E+01	5.08E+02	3.99E+01	9.79E+01
Eu-154	1.74E-02	6.55E-03	1.06E-02	3.52E-03	6.30E-02	0.00E+00	5.09E-01	1.22E-01	2.02E+00	1.05E-01	1.51E-01	3.91E-02	2.33E-01	1.84E-02	4.51E-02
Eu-155	2.42E-03	9.15E-04	1.47E-03	4.93E-04	8.80E-03	0.00E+00									6.30E-03
Pu-238	1.85E-02	6.97E-03	1.13E-02	3.75E-03	6.70E-02	0.00E+00	5.43E-01	1.30E-01	2.15E+00	1.11E-01	1.60E-01	4.15E-02	2.49E-01	1.96E-02	4.79E-02
Pu-239	6.96E-03	2.62E-03	4.23E-03	1.41E-03	2.52E-02	0.00E+00	2.04E-01	4.88E-02	8.08E-01	4.18E-02	6.05E-02	1.56E-02	9.33E-02	7.35E-03	1.80E-02
Pu-240	6.93E-03	2.61E-03	4.22E-03	1.41E-03	2.51E-02	0.00E+00	2.03E-01	4.86E-02	8.04E-01	4.17E-02	6.02E-02	1.56E-02	9.29E-02	7.32E-03	1.80E-02
Pu-241	9.27E-02	3.50E-02	5.63E-02	1.88E-02	3.36E-01	0.00E+00	2.72E+00	6.50E-01	1.08E+01	5.58E-01	8.07E-01	2.09E-01	1.25E+00	9.78E-02	2.41E-01
Pu-242															
Am-241	1.05E-01	3.94E-02	6.38E-02	2.13E-02	3.79E-01	0.00E+00	3.08E+00	7.34E-01	1.22E+01	6.30E-01	9.10E-01	2.35E-01	1.40E+00	1.11E-01	2.71E-01
Cm-243															
Cm-244	1.58E-02	5.94E-03	9.61E-03	3.20E-03	5.72E-02	0.00E+00	4.63E-01	1.11E-01	1.83E+00	9.51E-02	1.37E-01	3.54E-02	2.12E-01	1.67E-02	4.09E-02

3.7.2 Release Fractions

As stated in Section 2.4.2.9 of CPCC, 2023c, “Vault cover blocks and Tanks 103 and 105 have been core drilled and grouted. The area between the vault interiors and tank exteriors has been grouted. Shield plugs have been inserted in the bores through the cover blocks.” Therefore, the inventories of Tanks T-103 and T-105 will have no PTE.

A RF of 1E-03 (consistent with WAC 246-247) will conservatively be used for radiological inventory within tanks and piping which has not been stabilized with grout.

3.7.3 Point Source PTE

Table 34 calculates the point source PTE from the HLV/LLV. Column B calculates the ungrouted HLV/LLV inventory. As stated in Section 3.7.2, the inventories of Tanks (and Pots) 103 and 105 have been completely stabilized with grout and will have no PTE, therefore, are not included in the Column B inventory. The ungrouted tank inventories were obtained from Table 33. The Point Source PTE was calculated as follows.

$$= \frac{(\text{Total Ungrouted Inventory Column B, Ci})(\text{RF of } 1\text{E} - 03)}{\text{Duration of Activity, 2 Years}}$$

Table 34 – HLV/LLV Point Source PTE

A	B	C
Nuclide	**Total Ungrouted Inventory (Ci)**	**PTE (Ci/yr)**
Co-60		
Se-79		
Sr-90	1.39E+03	6.96E-01
Y-90	1.39E+03	6.96E-01
Tc-99		
Sb-125		
Te-125m		
Cs-134		
Cs-137	2.67E+03	1.33E+00
Ba-137m	2.52E+03	1.26E+00
Eu-154	1.16E+00	5.78E-04
Eu-155	1.16E-02	5.80E-06
Pu-238	1.23E+00	6.15E-04
Pu-239	4.63E-01	2.31E-04
Pu-240	4.60E-01	2.30E-04
Pu-241	6.17E+00	3.09E-03
Pu-242		
Am-241	6.97E+00	3.49E-03
Cm-243		
Cm-244	1.05E+00	5.25E-04

3.7.4 Fugitive Source PTE

Prior to stabilization of the A-Frame filters and shut down of the facility's ventilation system, the internal volumes for each of the HLV and LLV tanks and their respective pots will be stabilized with grout. In addition, the volume of the concrete vault that house the HLV and LLV tanks will be stabilized with grout to form large monoliths. Given that all of the inventory will be stabilized, no fugitive source PTE will occur.

3.8 A-Frame Filter Room

Inventories are calculated for the 1st stage exhaust HEPA filters (A-Frame filters). Filters located within the REC cells are not included within this section, but are included as part of the REC cell inventory and addressed in different portions of this calculation.

3.8.1 Inventory

The inventory for the A-Frame HEPA Filters was obtained from Table A-1 of TE-WL-17-001-07 and was decay corrected to January 1, 2026. As discussed in TE-WL-17-001-07, only nuclides that contributed >0.01% of radioactivity were retained. The inventory is shown in Table 35.

Table 35 – Radiological Inventory for the A-Frame HEPA Filters

A	B
Nuclide	**Inventory (Ci)**
Co-60	
Se-79	
Sr-90	9.35E+00
Y-90	9.35E+00
Tc-99	
Sb-125	
Te-125m	
Cs-134	
Cs-137	1.78E+01
Ba-137m	1.68E+01
Eu-154	1.07E-02
Eu-155	
Pu-238	7.55E-03
Pu-239	2.72E-03
Pu-240	2.70E-03
Pu-241	4.76E-02
Pu-242	
Am-241	4.09E-02
Cm-243	
Cm-244	7.65E-03

3.8.2 Release Fractions

A RF of 1E-03 (consistent with WAC 246-247) will conservatively be used for radiological inventory of the A-Frame HEPA filters for point source emissions.

The A-Frame Filter room will be grouted and removed as a single large monolith. The inventory of the HEPA filters and the A-Frame Filter room will be completely encapsulated in grout and removed as a single monolith with no internal cuts or separation. Therefore, no fugitive source PTE is assigned from the A-Frame Filters and A-Frame Filter room removal activities.

3.8.3 Point Source PTE

The point source PTE for the A-Frame filters is calculated in Table 36 and calculated as follows:

$$= \frac{(\text{Inventory from Table 35, Ci})(\text{RF of 1E} - 03)}{\text{Duration of Activity, 2 Years}}$$

324 Building emissions will be point source emissions until the A-frame filters are stabilized. After stabilization, the ventilation system will no longer be functional and emissions will be considered fugitive. Although A-Frame inventory may increase over time due to D4 activities (before stabilization), these activities are accounted for in other portions of this calculation and won't be accounted for twice.

Table 36 – Point Source PTE for A-Frame Filters

A	B
Nuclide	**PTE (Ci/yr)**
Co-60	
Se-79	
Sr-90	4.67E-03
Y-90	4.68E-03
Tc-99	
Sb-125	
Te-125m	
Cs-134	
Cs-137	8.90E-03
Ba-137m	8.40E-03
Eu-154	5.35E-06
Eu-155	
Pu-238	3.78E-06
Pu-239	1.36E-06
Pu-240	1.35E-06
Pu-241	2.38E-05
Pu-242	
Am-241	2.04E-05
Cm-243	
Cm-244	3.82E-06

3.8.4 Fugitive Source PTE

The A-Frame Filter room will be grouted and removed as a single large monolith. The inventory of the HEPA filters and the A-Frame Filter room will be completely encapsulated in grout and removed as a single monolith with no internal cuts or separation. Therefore, no fugitive source PTE is assigned from the A-Frame Filters and A-Frame Filter room removal activities.

Cuts at the outside wall of the A-Frame Filter room will be performed. These cuts will have the PTE by exposing exhaust ductwork that enter/exit the A-Frame Filter Room. The cuts associated with the REC exhaust ductwork are addressed in Section 3.9.

3.9 REC Exhaust Ductwork

The REC exhaust ductwork consist of metal piping legs of various diameters and lengths connecting the REC Cells and HLV/LLV to the A-Frame filters. REC exhaust ductwork may be stabilized with a fixative and portions of ductwork below the REC A and C Cells may be grouted to provide structural support for the A and the C/D Cell monoliths. Ductwork will be downsized using standard demolition techniques (e.g., mechanical sheer, hammer, bucket, etc. on heavy equipment) to fit into standard ERDF containers after the monoliths are removed.

3.9.1 Inventory

The inventory for the REC exhaust ductwork was obtained from Table A-1 of TE-WL-17-001-07 and was decay corrected to January 1, 2026. As discussed in TE-WL-17-001-07, only nuclides that contributed >0.01% of radioactivity were retained. The inventory is shown in Table 37.

Table 37 – REC Ductwork Inventory

A	B
Nuclide	**Inventory (Ci)**
Co-60	
Se-79	
Sr-90	7.48E+00
Y-90	7.48E+00
Tc-99	
Sb-125	
Te-125m	
Cs-134	
Cs-137	1.43E+01
Ba-137m	1.35E+01
Eu-154	8.53E-03
Eu-155	
Pu-238	6.04E-03
Pu-239	2.17E-03
Pu-240	2.17E-03
Pu-241	3.81E-02
Pu-242	
Am-241	3.27E-02
Cm-243	
Cm-244	6.12E-03

3.9.2 Release Fraction

Although a portion of the REC Ductwork may be grouted, further grout stabilization may occur, and surface contamination will be fixed within the ductwork, no credit for this stabilization will be taken into consideration. Conservatively, a RF consistent with particulate contamination, 1E-03 consistent with WAC 246-247, will be used.

3.9.3. Point Source PTE

Table 38 calculates the point source PTE from the REC Ductwork. The PTE is calculated as follows:

$$= \frac{(\text{REC Ductwork Inventory, Ci})(\text{RF of } 1\text{E}-03)}{\text{Duration of Activity, 2 years}}$$

Table 38 – REC Ductwork Point Source PTE

A	B	C
Nuclide	**Inventory (Ci)**	**PTE (Ci/yr)**
Co-60		
Se-79		
Sr-90	7.48E+00	3.74E-03
Y-90	7.48E+00	3.74E-03
Tc-99		
Sb-125		
Te-125m		
Cs-134		
Cs-137	1.43E+01	7.15E-03
Ba-137m	1.35E+01	6.75E-03
Eu-154	8.53E-03	4.27E-06
Eu-155		
Pu-238	6.04E-03	3.02E-06
Pu-239	2.17E-03	1.09E-06
Pu-240	2.17E-03	1.09E-06
Pu-241	3.81E-02	1.91E-05
Pu-242		
Am-241	3.27E-02	1.64E-05
Cm-243		
Cm-244	6.12E-03	3.06E-06

3.9.4 Fugitive Source PTE

Table 39 calculates the fugitive source PTE from the REC Ductwork. The PTE is calculated as follows:

$$= \frac{(\text{REC Ductwork Inventory, Ci})(\text{RF of } 1\text{E} - 03)}{\text{Duration of Activity, 5 years}}$$

Table 39 – REC Ductwork Fugitive Source PTE

A	B	C
Nuclide	Inventory (Ci)	PTE (Ci/yr)
Co-60		
Se-79		
Sr-90	7.48E+00	1.50E-03
Y-90	7.48E+00	1.50E-03
Tc-99		
Sb-125		
Te-125m		
Cs-134		
Cs-137	1.43E+01	2.86E-03
Ba-137m	1.35E+01	2.70E-03
Eu-154	8.53E-03	1.71E-06
Eu-155		
Pu-238	6.04E-03	1.21E-06
Pu-239	2.17E-03	4.34E-07
Pu-240	2.17E-03	4.34E-07
Pu-241	3.81E-02	7.62E-06
Pu-242		
Am-241	3.27E-02	6.54E-06
Cm-243		
Cm-244	6.12E-03	1.22E-06

3.10 Zone I and II Containments

Zone I and II containment structures were used for performing contaminated work outside the main process cells. Zone I and II containment surface contamination may be fixed and either removed as one piece or removed from the facility with heavy equipment.

3.10.1 Inventory

The inventory for the Zone I and II Containments were obtained from Table A-5 of TE-WL-17-001-07 and was decay corrected to January 1, 2026. As discussed in TE-WL-17-001-07, only nuclides that contributed >0.01% of radioactivity were retained. The inventory is shown in Table 40.

3.10.2 Release Fraction

Although some of the surface contamination within the containments will be stabilized, the entire inventory is assumed to be released as particulate (a RF of 1E-03 consistent with WAC 246-247).

3.10.3 Point Source PTE

Table 40, Column D calculates the point source PTE from the Zone I and II Containments. The PTE is calculated as follows:

$$= \frac{(\text{Zone I \&II Containment Inventory from Columns B \&C, Ci})(\text{RF of 1E} - 03)}{\text{Duration of Activity, 2 years}}$$

Table 40 – Zone I and II Containments Point Source PTE

A	B	C	D
Nuclide	**Zone I Containments Inventory (Ci)**	**Zone II Containments Inventory (Ci)**	**PTE (Ci/yr)**
Co-60			
Se-79			
Sr-90	4.02E-02	2.36E-02	3.19E-05
Y-90	4.02E-02	2.36E-02	3.19E-05
Tc-99			
Sb-125			
Te-125m			
Cs-134			
Cs-137	7.66E-02	4.50E-02	6.08E-05
Ba-137m	7.23E-02	4.25E-02	5.74E-05
Eu-154	3.97E-05	2.33E-05	3.15E-08
Eu-155	6.61E-06	3.88E-06	5.25E-09
Pu-238	9.79E-05	6.29E-05	8.04E-08
Pu-239	3.59E-05	2.31E-05	2.95E-08
Pu-240	3.56E-05	2.29E-05	2.93E-08
Pu-241	1.93E-04	1.14E-04	1.54E-07
Pu-242			
Am-241	5.13E-04	3.30E-04	4.22E-07
Cm-243			
Cm-244	9.23E-05	5.93E-05	7.58E-08

3.10.4 Fugitive Source PTE

Table 41, Column D calculates the fugitive source PTE from the Zone I and II Containments. The PTE is calculated as follows:

$$= \frac{(\text{Zone I \&II Containment Inventory from Columns B \&C, Ci})(\text{RF of 1E} - 03)}{\text{Duration of Activity, 5 years}}$$

Table 41 – Zone I and II Containments Fugitive Source PTE

A	B	C	D
Nuclide	**Zone I Containments Inventory (Ci)**	**Zone II Containments Inventory (Ci)**	**PTE (Ci/yr)**
Co-60			
Se-79			
Sr-90	4.02E-02	2.36E-02	1.28E-05
Y-90	4.02E-02	2.36E-02	1.28E-05
Tc-99			
Sb-125			
Te-125m			
Cs-134			
Cs-137	7.66E-02	4.50E-02	2.43E-05
Ba-137m	7.23E-02	4.25E-02	2.30E-05
Eu-154	3.97E-05	2.33E-05	1.26E-08
Eu-155	6.61E-06	3.88E-06	2.10E-09
Pu-238	9.79E-05	6.29E-05	3.22E-08
Pu-239	3.59E-05	2.31E-05	1.18E-08
Pu-240	3.56E-05	2.29E-05	1.17E-08
Pu-241	1.93E-04	1.14E-04	6.14E-08
Pu-242			
Am-241	5.13E-04	3.30E-04	1.69E-07
Cm-243			
Cm-244	9.23E-05	5.93E-05	3.03E-08

3.11 HEPA Filters

The 324 Building has a number of filters located throughout the building. This section will discuss the status of HEPA filters throughout the building, provide inventories, and calculate a PTE for this inventory.

- The following HEPA filters have no radiological inventory associated with them, therefore have no PTE.
  - POG & VV Filter Room, Filters F-111, F-112, and F-113 (also known as HEPA Filters F-109A, F-109B, and F-109C)
  - Room 3A, Storage Vault and Hood/Canopy/Glovebox Exhaust HEPA filters
  - EDL, Room 101, Normal Exhaust HEPA (Primary and Secondary) filters and the Emergency Exhaust HEPA (Primary and Secondary) filters
- The following have been removed from the building
  - Hood/Canopy filters in Room 146
  - Room 138, Decon Stall (Load Out Stall) Exhaust HEPA filters
  - Room 147, Radwaste Compactor, Hood-1, Hood-2, Hood-3, and Glove Box
- The D Cell Dust Stop Filter in Room 246 (also known as the D Cell Exhaust Plenum Roughing Filter) was also moved into A-Cell and is addressed in Section 3.1 of this calculation.

3.11.1 Inventory

The inventory for HEPA filters throughout the 324 Building were obtained from Table A-6 of TE-WL-17-001-07 and was decay corrected to January 1, 2026. As discussed in TE-WL-17-001-07, only nuclides that contributed >0.01% of radioactivity were retained. The inventory is shown in Table 42 and 43.

Table 42 – HEPA Filter Inventory (1 of 2)

A	B	C	D	E	F	G	H
Nuclide	**Rm 3C Hood Exhaust HEPA (Ci)**	**Rm 9 Zone 1 Exhaust Plenum HEPA (Ci)**	**Rm 10 Zone 1 Exhaust Plenum HEPA (Ci)**	**Rm 11 POG & VV Room F-102 HEPA (Ci)**	**Rm 11 POG & VV Room F-104 HEPA (Ci)**	**Rm 11 POG & VV Room F-106 HEPA (Ci)**	**Rm 134 C-Cell Exhaust Plenum Roughing Filter (Ci)**
Co-60	1.89E-07	1.81E-04	3.04E-04	9.55E-04	2.23E-03	2.10E-04	4.04E-05
Se-79							
Sr-90	6.32E-04	6.03E-01	1.01E+00	3.18E+00	7.42E+00	7.01E-01	1.35E-01
Y-90	6.32E-04	6.04E-01	1.01E+00	3.19E+00	7.42E+00	7.01E-01	1.35E-01
Tc-99							
Sb-125							
Te-125m							
Cs-134							
Cs-137	2.17E-05	2.07E-02	3.48E-02	1.09E-01	2.55E-01	2.40E-02	4.63E-03
Ba-137m	2.05E-05	1.96E-02	3.28E-02	1.03E-01	2.41E-01	2.26E-02	4.37E-03
Eu-154	3.14E-08	3.00E-05	5.03E-05	1.58E-04	3.69E-04	3.47E-05	6.69E-06
Eu-155							
Pu-238	1.77E-08	1.68E-05	2.83E-05	8.90E-05	2.08E-04	1.96E-05	3.76E-06
Pu-239							
Pu-240	1.45E-08	1.37E-05	2.31E-05	7.26E-05	1.69E-04	1.60E-05	3.07E-06
Pu-241	1.81E-07	1.73E-04	2.90E-04	9.13E-04	2.13E-03	2.00E-04	3.86E-05
Pu-242							
Am-241	1.41E-07	1.35E-04	2.27E-04	7.11E-04	1.66E-03	1.56E-04	3.01E-05
Cm-243							
Cm-244	3.78E-07	3.61E-04	6.05E-04	1.91E-03	4.44E-03	4.18E-04	8.05E-05

Table 43 – HEPA Filter Inventory (2 of 2)

A	B	C	D	E	F	G	H
Nuclide	**Rm 135 REC Airlock Exhaust Plenum Roughing Filter (Ci)**	**SMF Basement Rm 3 Exhaust HEPA (Ci)**	**Rm 6 Zone 2 Exhaust Plenum HEPA (Ci)**	**Rm 7 Zone 2 Exhaust Plenum HEPA (Ci)**	**Rm 309A Hood Exhaust HEPA (Ci)**	**Rm 316 Filter Room 306/309 VV Exhaust (Ci)**	**Rm 317 Bldg Vacuum Air Sample Supply HEPA (Ci)**
Co-60	7.92E-05	5.05E-08	2.89E-07	2.44E-06	1.99E-09	3.98E-08	1.59E-08
Se-79							
Sr-90	2.64E-01	1.69E-04	9.66E-04	8.16E-03	6.62E-06	1.33E-04	5.30E-05
Y-90	2.64E-01	1.69E-04	9.66E-04	8.17E-03	6.62E-06	1.33E-04	5.30E-05
Tc-99							
Sb-125							
Te-125m							
Cs-134							
Cs-137	9.06E-03	5.79E-06	3.31E-05	2.79E-04	2.27E-07	4.55E-06	1.82E-06
Ba-137m	8.55E-03	5.46E-06	3.13E-05	2.64E-04	2.15E-07	4.29E-06	1.72E-06
Eu-154	1.31E-05	8.36E-09	4.79E-08	4.04E-07	3.27E-10	6.58E-09	2.63E-09
Eu-155							
Pu-238	7.39E-06	4.71E-09	2.70E-08	2.27E-07	1.85E-10	3.70E-09	1.48E-09
Pu-239							
Pu-240	6.02E-06	3.84E-09	2.20E-08	1.86E-07	1.51E-10	3.02E-09	1.21E-09
Pu-241	7.56E-05	4.84E-08	2.76E-07	2.33E-06	1.90E-09	3.79E-08	1.52E-08
Pu-242							
Am-241	5.90E-05	3.76E-08	2.15E-07	1.82E-06	1.48E-09	2.96E-08	1.18E-08
Cm-243							
Cm-244	1.58E-04	1.01E-07	5.78E-07	4.87E-06	3.96E-09	7.94E-08	3.17E-08

3.11.2 Release Fraction

The HEPA filter inventory is assumed to be released as particulate (a RF of 1E-03 consistent with WAC 246-247), with exceptions noted for HEPA filters which will be grouted and have no PTE.

3.11.3 Point Source PTE

Table 44 calculates the point source PTE for the HEPA filters throughout the building. The PTE is calculated as follows.

$$= \frac{(\text{Sum HEPA Filters from Tables 42 and 43, Ci})(\text{RF of 1E} - 03)}{\text{Duration of Activity, 2 years}}$$

Table 44 – HEPA Filter Point Source PTE

A	B
Nuclide	**PTE (Ci/yr)**
Co-60	2.00E-06
Se-79	
Sr-90	6.66E-03
Y-90	6.67E-03
Tc-99	
Sb-125	
Te-125m	
Cs-134	
Cs-137	2.29E-04
Ba-137m	2.16E-04
Eu-154	3.31E-07
Eu-155	
Pu-238	1.87E-07
Pu-239	
Pu-240	1.52E-07
Pu-241	1.91E-06
Pu-242	
Am-241	1.49E-06
Cm-243	
Cm-244	3.99E-06

3.11.4 Fugitive Source PTE

Table 45 calculates the fugitive source PTE from the HEPA filters throughout the building. The PTE is calculated as follows. The exhaust plenum roughing filters in Room 134 (C Cell) and Room 135 (REC Airlock) will be stabilized with grout prior to the exhaust stack being shut down; therefore, no fugitive source PTE will exist.

$$= \frac{(\text{Sum of HEPA Filters from Tables 42 and 43, Except 2 Filters Noted Above})(\text{RF of 1E} - 03)}{\text{Duration of Activity, 5 years}}$$

Table 45 – HEPA Filter Fugitive Source PTE

A	B
Nuclide	**PTE (Ci/yr)**
Co-60	7.77E-07
Se-79	
Sr-90	2.58E-03
Y-90	2.59E-03
Tc-99	
Sb-125	
Te-125m	
Cs-134	
Cs-137	8.88E-05
Ba-137m	8.39E-05
Eu-154	1.29E-07
Eu-155	
Pu-238	7.24E-08
Pu-239	
Pu-240	5.89E-08
Pu-241	7.42E-07
Pu-242	
Am-241	5.78E-07
Cm-243	
Cm-244	1.55E-06

3.12 Process Off-Gas and Vessel Vent Piping

Contamination within the Process Off-Gas (POG) and Vessel Ventilation (VV) piping may be stabilized with grout or epoxy in accessible areas. Piping between Room 11 and the LLV will be filled with grout and completely stabilized. Some piping is embedded within monolith walls and therefore inaccessible. As such, complete stabilization of piping cannot be guaranteed. Although a portion of the piping will be stabilized, it is conservatively assumed that all of the inventory will have a PTE.

3.12.1 Inventory

The inventory for POG and VV piping were obtained from Table A-8 of TE-WL-17-001-07 and was decay corrected to January 1, 2026. As discussed in TE-WL-17-001-07, only nuclides that contributed >0.01% of radioactivity were retained. The inventory is shown in Table 46.

3.12.2 Release Fraction

Consistent with WAC 246-247, a RF of 1E-03 will conservatively be applied to the entire inventory of the POG / VV piping which is assumed to all be in the form of particulate, including those lengths of the piping which will be within monoliths or outside of monoliths and filled with grout or epoxy.

3.12.3 Point Source PTE

Table 46 calculates the point source PTE from the POG/VV Piping. The PTE is calculated as follows:

$$= \frac{(\text{POG \&VV Piping, Ci})(\text{RF of 1E} - 03)}{\text{Duration of Activity, 2 years}}$$

Table 46 – POG / VV Piping Inventory and Point Source PTE

A	B	C
Nuclide	**Inventory (Ci)**	**PTE (Ci/yr)**
Co-60		
Se-79		
Sr-90	3.59E-01	1.80E-04
Y-90	3.59E-01	1.80E-04
Tc-99		
Sb-125		
Te-125m		
Cs-134		
Cs-137	6.85E-01	3.43E-04
Ba-137m	6.46E-01	3.23E-04
Eu-154	3.54E-04	1.77E-07
Eu-155	5.93E-05	2.97E-08
Pu-238	3.00E-04	1.50E-07
Pu-239	1.10E-04	5.50E-08
Pu-240	1.09E-04	5.45E-08
Pu-241	1.73E-03	8.65E-07
Pu-242		
Am-241	1.65E-03	8.25E-07
Cm-243		
Cm-244	2.84E-04	1.42E-07

3.12.4 Fugitive Source PTE

Table 47 calculates the fugitive source PTE from the POG / VV Piping. The PTE is calculated as follows:

$$= \frac{(\text{POG \&VV Piping, Ci})(\text{RF of } 1\text{E} - 03)}{\text{Duration of Activity, 5 years}}$$

Table 47 – POG / VV Inventory and Fugitive Source PTE

A	B	C
Nuclide	**Inventory (Ci)**	**PTE (Ci/yr)**
Co-60		
Se-79		
Sr-90	3.59E-01	7.18E-05
Y-90	3.59E-01	7.18E-05
Tc-99		
Sb-125		
Te-125m		
Cs-134		
Cs-137	6.85E-01	1.37E-04
Ba-137m	6.46E-01	1.29E-04
Eu-154	3.54E-04	7.08E-08
Eu-155	5.93E-05	1.19E-08
Pu-238	3.00E-04	6.00E-08
Pu-239	1.10E-04	2.20E-08
Pu-240	1.09E-04	2.18E-08
Pu-241	1.73E-03	3.46E-07
Pu-242		
Am-241	1.65E-03	3.30E-07
Cm-243		
Cm-244	2.84E-04	5.68E-08

3.13 High Level Vault (HLV) and Low Level Vault (LLV) Process Piping

Based on engineering judgment from evaluation of WCH, 2011b and facility drawings, over 90% of the HLV piping will be within the HLV monolith, which will be stabilized with grout and removed as a single large monolith. Therefore, piping that is within the grouted monolith will have no potential to emit. To be conservative, it is assumed that 10% of the HLV piping will reside outside of the monolith and will have a potential to emit. This percentage will be taken into account within the fugitive source PTE only.

The LLV piping follows similar passages as the HLV piping, but various LLV piping lengths are known to reside outside of the LLV. Based on engineering judgment from evaluation of WCH, 2011b and facility drawings, over 50% of the LLV piping will be within the LLV monolith which will be stabilized with grout and removed as a single large monolith. Therefore, piping that is within the grouted monolith will have no potential to emit. To be conservative, it is assumed that 50% of the LLV piping resides outside of the LLV monolith and will have a potential to emit. This percentage will be taken into account within the fugitive source PTE only.

Piping which is not within one of the monoliths will be downsized using standard demolition techniques (e.g., mechanical sheer on heavy equipment) to fit into ~20 ft ERDF containers. Because of the lack of accessibility, the HLV/LLV piping contamination outside the monoliths may not be fixed.

3.13.1 Inventory

The inventory for HLV and LLV process piping were obtained from Tables A-2 and A-3 of TE-WL-17-001-07 and was decay corrected to January 1, 2026. As discussed in TE-WL-17-001-07, only nuclides that contributed >0.01% of radioactivity were retained. The inventory is shown in Table 48.

3.13.2 Release Fraction

The inventory that will be disturbed during removal activities outside of the monoliths is assumed to have the potential to be released in the form of particulate and assigned a RF of 1E-03, consistent with WAC 246-247.

3.13.3 Point Source PTE

The point source PTE for the HLV and LLV process pipe is calculated in Table 48. This is calculated as follows.

$$= \frac{(\text{HLV and LLV Process Piping Inventory from Columns B \&C, Ci})(\text{RF of } 1\text{E} - 03)}{\text{Duration of Activity, 2 years}}$$

Table 48 – Point Source PTE for HLV and LLV Process Piping

A	B	C	D
Nuclide	HLV Process Piping Inventory (Ci)	LLV Process Piping Inventory (Ci)	PTE (Ci/yr)
Co-60			
Se-79			
Sr-90	3.88E+03	1.76E+02	2.03E+00
Y-90	3.88E+03	1.76E+02	2.03E+00
Tc-99			
Sb-125			
Te-125m			
Cs-134			
Cs-137	7.43E+03	3.37E+02	3.88E+00
Ba-137m	7.02E+03	3.18E+02	3.67E+00
Eu-154	3.22E+00	1.46E-01	1.68E-03
Eu-155		2.04E-02	1.02E-05
Pu-238	3.43E+00	1.55E-01	1.79E-03
Pu-239	1.29E+00	5.84E-02	6.74E-04
Pu-240	1.28E+00	5.82E-02	6.69E-04
Pu-241	1.72E+01	7.80E-01	8.99E-03
Pu-242			
Am-241	1.95E+01	8.80E-01	1.02E-02
Cm-243			
Cm-244	2.93E+00	1.33E-01	1.53E-03

3.13.4 Fugitive Source PTE

The fugitive source PTE for the HLV and LLV process pipe is calculated in Table 49. The basis for each column or how values in each column were calculated in Table 29 are provided as follows:

Column B – Taken directly from Table A-2 of TE-WL-17-001-07.

Column C - Taken directly from Table A-3 of TE-WL-17-001-07.

Column D – The HLV fugitive source PTE was calculated as follows.

$$= \frac{(\text{HLV Process Piping Inventory from Columns B, Ci})(\text{Fraction of Ungrouted Inventory, } 0.1)(\text{RF of } 1\text{E} - 03)}{\text{Duration of Activity, 5 years}}$$

Column E – The LLV fugitive source PTE was calculated as follows.

$$= \frac{(\text{LLV Process Piping Inventory from Columns C, Ci})(\text{Fraction of Ungrouted Inventory, } 0.5)(\text{RF of } 1\text{E} - 03)}{\text{Duration of Activity, 5 years}}$$

Column F – Sums the HLV and LLV fugitive source PTE values from Columns D and E for each nuclide.

Table 49 – Fugitive Source PTE for HLV and LLV Process Piping

A	B	C	D	E	F
Nuclide	HLV Process Piping Inventory (Ci)	LLV Process Piping Inventory (Ci)	HLV PTE (Ci/yr)	HLV PTE (Ci/yr)	Total HLV/LLV PTE (Ci/yr)
Co-60					
Se-79					
Sr-90	3.88E+03	1.76E+02	7.76E-02	1.76E-02	9.52E-02
Y-90	3.88E+03	1.76E+02	7.76E-02	1.76E-02	9.52E-02
Tc-99					
Sb-125					
Te-125m					
Cs-134					
Cs-137	7.43E+03	3.37E+02	1.49E-01	3.37E-02	1.82E-01
Ba-137m	7.02E+03	3.18E+02	1.40E-01	3.18E-02	1.72E-01
Eu-154	3.22E+00	1.46E-01	6.44E-05	1.46E-05	7.90E-05
Eu-155		2.04E-02		2.04E-06	2.04E-06
Pu-238	3.43E+00	1.55E-01	6.86E-05	1.55E-05	8.41E-05
Pu-239	1.29E+00	5.84E-02	2.58E-05	5.84E-06	3.16E-05
Pu-240	1.28E+00	5.82E-02	2.56E-05	5.82E-06	3.14E-05
Pu-241	1.72E+01	7.80E-01	3.44E-04	7.80E-05	4.22E-04
Pu-242					
Am-241	1.95E+01	8.80E-01	3.90E-04	8.80E-05	4.78E-04
Cm-243					
Cm-244	2.93E+00	1.33E-01	5.86E-05	1.33E-05	7.19E-05

3.14 Radioactive Liquid-Waste System (RLWS) and Retired Radioactive Liquid-Waste System (RRLWS)

Source term/contamination within the RLWS and RRLWS piping may be stabilized with epoxy or grout, removed and downsized to fit into ERDF containers. Grout and epoxy addition may be used to fill the internal volume of piping rendering the contamination within the piping stabilized. The RRLWS system is also known as the Crib Waste Sewer (CBWS).

3.14.1 Inventory

The inventory for RLWS and RRLWS were obtained from Tables A-8 of TE-WL-17-001-07 and was decay corrected to January 1, 2026. As discussed in TE-WL-17-001-07, only nuclides that contributed >0.01% of radioactivity were retained. The inventory is shown in Table 50.

3.14.2 Release Fraction

Prior to being grouted, the surface contamination located within the piping will apply a RF of 1E-03 (consistent with WAC 246-247).

The RLWS and RRLWS/CBWS piping may be filled with epoxy or grout prior to the exhaust stack being shut down. Given the uncertainty of knowing how much of the piping can be filled and contamination fixed, it is conservatively assumed no contamination will be fixed and a release fraction of 1E-03 will be applied to all contamination during fugitive emissions.

3.14.3 Point Source PTE

Table 50 calculates the point source PTE from the RLWS and also RRLWS/CBWS Piping. The PTE is calculated as follows for the RLWS piping:

$$= \frac{(\text{RLWS Piping, Ci})(\text{RF of } 1\text{E} - 03)}{\text{Duration of Activity, 2 years}}$$

Table 50 – RLWS and RRLWS/CBWS Piping Point Source PTE

A	B	C	D	E
Nuclide	RLWS Piping Inventory (Ci)	RRLWS/CBWS Piping Inventory (Ci)	RLWS PTE (Ci/yr)	RRLWS/CBWS PTE (Ci/yr)
Co-60				
Se-79				
Sr-90	3.35E-04	3.35E-04	1.68E-07	1.68E-07
Y-90	3.35E-04	3.35E-04	1.68E-07	1.68E-07
Tc-99				
Sb-125				
Te-125m				
Cs-134				
Cs-137	6.38E-04	6.38E-04	3.19E-07	3.19E-07
Ba-137m	6.03E-04	6.03E-04	3.02E-07	3.02E-07
Eu-154	3.30E-07	3.30E-07	1.65E-10	1.65E-10
Eu-155	5.52E-08	5.52E-08	2.76E-11	2.76E-11
Pu-238	2.81E-07	2.81E-07	1.41E-10	1.41E-10
Pu-239	1.03E-07	1.03E-07	5.15E-11	5.15E-11
Pu-240	1.02E-07	1.02E-07	5.10E-11	5.10E-11
Pu-241	1.61E-06	1.61E-06	8.05E-10	8.05E-10
Pu-242				
Am-241	1.54E-06	1.54E-06	7.70E-10	7.70E-10
Cm-243				
Cm-244	2.64E-07	2.64E-07	1.32E-10	1.32E-10

3.14.4 Fugitive Source PTE

Table 51 calculates the fugitive source PTE from the RLWS and RRLWS/CBWS Piping. The PTE is calculated as follows for the RLWS piping:

$$= \frac{(\text{RLWS Piping, Ci})(\text{RF of } 1\text{E} - 03)}{\text{Duration of Activity, 5 years}}$$

Table 51 – RLWS and RRLWS/CBWS Fugitive Source PTE

A	B	C	D	E
Nuclide	RLWS Piping Inventory (Ci)	RRLWS/CBWS Piping Inventory (Ci)	RLWS PTE (Ci/yr)	RRLWS/CBWS PTE (Ci/yr)
Co-60				
Se-79				
Sr-90	3.35E-04	3.35E-04	6.70E-08	6.70E-08
Y-90	3.35E-04	3.35E-04	6.70E-08	6.70E-08
Tc-99				
Sb-125				
Te-125m				
Cs-134				
Cs-137	6.38E-04	6.38E-04	1.28E-07	1.28E-07
Ba-137m	6.03E-04	6.03E-04	1.21E-07	1.21E-07
Eu-154	3.30E-07	3.30E-07	6.60E-11	6.60E-11
Eu-155	5.52E-08	5.52E-08	1.10E-11	1.10E-11
Pu-238	2.81E-07	2.81E-07	5.62E-11	5.62E-11
Pu-239	1.03E-07	1.03E-07	2.06E-11	2.06E-11
Pu-240	1.02E-07	1.02E-07	2.04E-11	2.04E-11
Pu-241	1.61E-06	1.61E-06	3.22E-10	3.22E-10
Pu-242				
Am-241	1.54E-06	1.54E-06	3.08E-10	3.08E-10
Cm-243				
Cm-244	2.64E-07	2.64E-07	5.28E-11	5.28E-11

3.15 300-265 Transfer Line

The 300-265 waste site is an interbuilding pipeline formerly used to transfer high-activity liquid waste and process off-gases between the 324 Building Radiological Engineering Complex and the 325A Building hot cells. The pipeline is called the inter-building transfer line on system drawings. The 300-265 waste site/pipeline is 306 m long (1,000 feet) and buried from 1 to 4 m (3 to 12 feet) in depth. The major east-west straight section, about 200 m long, consists of a 2-inch diameter, Schedule 40, 304L stainless-steel welded pipe encased within a 4-inch fiberglass-reinforced epoxy (FRE) pipe. Later during operating of the transfer line, two Schedule 40,304L stainless-steel welded pipes of ⅜ and ¾-inch diameter were assembled, tested and drawn through the 2-inch line and extended to each of the buildings. These two smaller pipes contained high level waste. Overall, the transfer line runs in an east-west direction and has a downward slope of about 0.5 percent from the 325 Building to the 324 Building.

The 300-265 fuel transfer line may be impacted during the demolition of the 324 building due to needed lay back space. The transfer line remediation design has multiple planned tie-in locations along the length of the pipe. The closest tie-in location that is conservatively outside of the anticipated lay back area was selected as the interference point. The portion of the 300-265 transfer line inside of this inference point has been estimated to be 1/3 of the overall transfer line and therefore 1/3 of the

inventory is included in this calculation.

3.15.1 Inventory

The inventory for 300-265 transfer line was obtained from Tables A-8 of TE-WL-17-001-07 and was decay corrected to January 1, 2026. As discussed in TE-WL-17-001-07, only nuclides that contributed >0.01% of radioactivity were retained. The inventory is shown in Column B of Table 52.

3.15.2 Release Fraction

All piping to be epoxied/grouted and downsized with heavy equipment to be placed into waste containers. Consistent with *ALARA Post-Job Review: 340 Vault Removal*, WCH-601, Revision 0 (WCH 2014b), it is estimated only a fraction of the piping will be release, 5.19E-02, for remediating, downsizing, and loading epoxied/grouted piping into waste containers. Of the inventory that will be released, material will be released in the form of particulate and assigned a RF of 1E-03, consistent with WAC 246-247.

3.15.3 Point Source PTE

No point source emissions will occur. The 300-265 transfer line is not connected to the 324 Facility ventilation system. The 300-265 is currently buried and considered an inactive waste site.

3.15.4 Fugitive Source PTE

The fugitive source PTE is calculated as follows

$$= \frac{(\text{Inventory from Column B, Ci})(\text{Fraction to be Released, } 0.0519)(1\text{E} - 03)\left(\frac{1}{3}\text{of Transfer Line May Be Impacted}\right)}{(\text{Activity Duration, } 5 \text{ years})}$$

The PTE is shown in Column C of Table 52.

Table 52 – 300-265 Transfer Line Inventory and Fugitive Source PTE

A	B	C
Nuclide	**Inventory (Ci)**	**PTE (Ci/yr)**
Co-60	2.88E-03	9.96E-09
Se-79		
Sr-90	4.99E+00	1.73E-05
Y-90	5.00E+00	1.73E-05
Tc-99	2.70E-03	9.34E-09
Sb-125		
Te-125m		
Cs-134		
Cs-137	7.42E+00	2.57E-05
Ba-137m	7.01E+00	2.42E-05
Eu-154	5.16E-02	1.79E-07
Eu-155	1.87E-03	6.48E-09
Pu-238	1.45E-01	5.01E-07
Pu-239	2.53E-02	8.75E-08
Pu-240	4.30E-02	1.49E-07
Pu-241	1.11E+00	3.84E-06
Pu-242	1.42E-04	4.92E-10
Am-241	3.18E-01	1.10E-06
Cm-243	6.12E-04	2.12E-09
Cm-244	5.34E-02	1.85E-07

3.16 Contaminated Soil

Contaminated soil may be encountered during below grade D4 activities and monolith removal. To account for this potential, a radiological inventory and PTE are calculated for this material.

3.16.1 Inventory

The 300-296 UPR waste site contaminated soil is known to be present below the 324 Facility. Given that this waste site has been characterized, this radiological inventory will serve as the basis for any small amounts of soil contamination that may be encountered. It is conservatively assumed that 0.1% of the 300-296 waste site radiological inventory may be encountered during below grade D4 activities.

The inventory for 300-296 UPR waste site was obtained from Tables A-9 of TE-WL-17-001-07 and was decay corrected to January 1, 2026. As discussed in TE-WL-17-001-07, only nuclides that contributed >0.01% of radioactivity were retained. The entire 300-296 waste site inventory is shown in Column B of Table 53.

3.16.2 Release Fraction

Contaminated soil is assumed to have the potential to be released in the form of particulate and assigned a RF of 1E-03, consistent with WAC 246-247.

3.16.3 Point Source PTE

No point source PTE will occur. Contaminated soils will only have fugitive source emissions.

3.16.4 Fugitive Source PTE

The PTE is shown in Column C of Table 53 and calculated as follows:

$$= \frac{(\text{Inventory from Column B})(0.1\% \text{ of Column B Inventory})(1\text{E}-03)}{\text{Project Duration, 5 years}}$$

Table 53 – Contaminated Soil Inventory and Fugitive Source PTE

A	B	C
Nuclide	**Total 300-296 "Point Source" Inventory (Ci)**	**PTE (Ci/yr)**
Co-60		
Se-79		
Sr-90	3.31E+04	6.62E-03
Y-90	3.31E+04	6.62E-03
Tc-99		
Sb-125		
Te-125m		
Cs-134		
Cs-137	1.12E+05	2.24E-02
Ba-137m	1.06E+05	2.12E-02
Eu-154		
Eu-155		
Pu-238	6.49E+00	1.30E-06
Pu-239		
Pu-240		
Pu-241		
Pu-242		
Am-241	4.29E+00	8.58E-07
Cm-243		
Cm-244	4.99E+00	9.97E-07

3.17 Total Point Source and Fugitive Source PTE

PTE values for each inventory with the facility from Section 3.1 through 3.16 are summarized in

Tables 54 through 57. Tables 54 and 55 provide a summary for all point source emissions and sums the total PTE that will be used in Section 4.0 to calculate the TEDE. Tables 56 and 57 provide a summary for all fugitive source emissions and sums the total PTE that will be used in Section 4.0 to calculate the TEDE.

Table 54 – Total Point Source PTE (1 of 2)

A	B	C	D	E	F	G	H	I	J	K
Nuclide	A Cell PTE (Ci/year)	B Cell PTE (Ci/year)	C Cell PTE (Ci/year)	D Cell PTE (Ci/year)	Airlock Cell PTE (Ci/year)	REC Pipe Trench PTE (Ci/year)	SMF South Cell (Ci/year)	SMF East Cell (Ci/year)	SMF Airlock (Ci/year)	HLV/LLV Tanks (Ci/year)
Co-60	2.20E-08	5.00E-07	1.38E-10	7.23E-08	8.60E-10	9.89E-09	2.06E-09	2.06E-08	2.25E-08	0.00E+00
Se-79	1.50E-08	8.84E-09	1.06E-11	3.44E-10	4.20E-11	7.65E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sr-90	9.36E-03	1.02E-02	9.31E-06	2.51E-04	4.02E-05	6.70E-04	1.20E-08	1.20E-07	1.32E-07	6.96E-01
Y-90	9.37E-03	1.02E-02	9.32E-06	2.51E-04	4.02E-05	6.71E-04	1.20E-08	1.20E-07	1.32E-07	6.96E-01
Tc-99	4.97E-07	2.93E-07	3.52E-10	1.14E-08	1.40E-09	2.55E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sb-125	1.66E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.56E-09	3.58E-08	3.91E-08	0.00E+00
Te-125m	3.95E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.46E-10	8.50E-09	9.25E-09	0.00E+00
Cs-134	5.53E-12	0.00E+00	0.00E+00	6.64E-11	0.00E+00	0.00E+00	9.04E-13	0.00E+00	0.00E+00	0.00E+00
Cs-137	1.09E-02	1.92E-02	1.79E-05	1.29E-03	7.63E-05	1.28E-03	5.07E-07	5.10E-06	5.55E-06	1.33E+00
Ba-137m	1.03E-02	1.81E-02	1.69E-05	1.21E-03	7.20E-05	1.21E-03	4.78E-07	4.80E-06	5.25E-06	1.26E+00
Eu-154	9.66E-06	1.56E-05	7.72E-09	1.55E-06	4.02E-08	5.57E-07	2.62E-10	2.63E-09	2.88E-09	5.78E-04
Eu-155	1.26E-07	4.33E-06	1.08E-09	0.00E+00	6.97E-09	7.79E-08	9.25E-11	9.25E-10	1.02E-09	5.80E-06
Pu-238	3.25E-06	7.50E-06	8.26E-09	2.65E-07	3.36E-08	5.95E-07	7.43E-12	0.00E+00	0.00E+00	6.15E-04
Pu-239	1.21E-06	2.59E-06	3.10E-09	1.35E-07	1.23E-08	2.24E-07	2.78E-12	0.00E+00	0.00E+00	2.31E-04
Pu-240	1.22E-06	2.56E-06	3.08E-09	1.37E-07	1.22E-08	2.21E-07	2.76E-12	0.00E+00	0.00E+00	2.30E-04
Pu-241	1.84E-05	5.92E-05	4.13E-08	1.79E-06	1.93E-07	2.98E-06	3.72E-11	3.74E-10	4.08E-10	3.09E-03
Pu-242	1.97E-09	3.74E-09	5.09E-12	2.21E-10	2.01E-11	3.67E-10	0.00E+00	9.75E-10	0.00E+00	0.00E+00
Am-241	6.24E-05	3.87E-05	4.66E-08	1.55E-06	1.84E-07	3.36E-06	9.72E-11	0.00E+00	1.07E-09	3.49E-03
Cm-243	2.02E-07	1.66E-07	1.51E-10	2.24E-08	6.53E-10	1.09E-08	1.36E-13	0.00E+00	0.00E+00	0.00E+00
Cm-244	9.84E-06	8.99E-06	7.02E-09	1.03E-06	3.18E-08	5.07E-07	6.30E-12	0.00E+00	0.00E+00	5.25E-04

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Table 55 – Total Point Source PTE (2 of 2)

A	B	C	D	E	F	G	H	I	J
Nuclide	A Frame Filters (Ci/year)	REC Exhaust Ductwork (Ci/year)	Zone I&II Confinements (Ci/year)	HEPA Filters (Ci/year)	POG/VV Process Piping (Ci/year)	HLV/LLV Process Piping (Ci/year)	RLWS Piping (Ci/year)	RRLWS / CBWS Piping (Ci/year)	Total PTE (Ci/year)
Co-60	0.00E+00	0.00E+00	0.00E+00	2.00E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.65E-06
Se-79	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-08
Sr-90	4.67E-03	3.74E-03	3.19E-05	6.66E-03	1.80E-04	2.03E+00	1.68E-07	1.68E-07	2.76E+00
Y-90	4.68E-03	3.74E-03	3.19E-05	6.67E-03	1.80E-04	2.03E+00	1.68E-07	1.68E-07	2.76E+00
Tc-99	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.29E-07
Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.45E-07
Te-125m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.81E-08
Cs-134	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.28E-11
Cs-137	8.90E-03	7.15E-03	6.08E-05	2.29E-04	3.43E-04	3.88E+00	3.19E-07	3.19E-07	5.27E+00
Ba-137m	8.40E-03	6.75E-03	5.74E-05	2.16E-04	3.23E-04	3.67E+00	3.02E-07	3.02E-07	4.97E+00
Eu-154	5.35E-06	4.27E-06	3.15E-08	3.31E-07	1.77E-07	1.68E-03	1.65E-10	1.65E-10	2.30E-03
Eu-155	0.00E+00	0.00E+00	5.25E-09	0.00E+00	2.97E-08	1.02E-05	2.76E-11	2.76E-11	2.06E-05
Pu-238	3.78E-06	3.02E-06	8.04E-08	1.87E-07	1.50E-07	1.79E-03	1.41E-10	1.41E-10	2.43E-03
Pu-239	1.36E-06	1.09E-06	2.95E-08	0.00E+00	5.50E-08	6.74E-04	5.15E-11	5.15E-11	9.12E-04
Pu-240	1.35E-06	1.09E-06	2.93E-08	1.52E-07	5.45E-08	6.69E-04	5.10E-11	5.10E-11	9.06E-04
Pu-241	2.38E-05	1.91E-05	1.54E-07	1.91E-06	8.65E-07	8.99E-03	8.05E-10	8.05E-10	1.22E-02
Pu-242	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.30E-09
Am-241	2.04E-05	1.64E-05	4.22E-07	1.49E-06	8.25E-07	1.02E-02	7.70E-10	7.70E-10	1.38E-02
Cm-243	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-07
Cm-244	3.82E-06	3.06E-06	7.58E-08	3.99E-06	1.42E-07	1.53E-03	1.32E-10	1.32E-10	2.09E-03

Table 56 - Total Fugitive Source PTE (1 of 2)

A	B	C	D	E	F	G	H	I	J
Nuclide	A Cell PTE (Ci/year)	B Cell PTE (Ci/year)	C Cell PTE (Ci/year)	Airlock Cell PTE (Ci/year)	REC Pipe Trench PTE (Ci/year)	SMF South Cell (Ci/year)	SMF East Cell (Ci/year)	SMF Airlock (Ci/year)	REC Exhaust Ductwork (Ci/year)
Co-60	4.57E-12	1.54E-08	3.93E-12	4.86E-10	4.79E-09	2.24E-08	8.24E-09	9.00E-09	0.00E+00
Se-79	2.23E-13	2.72E-10	3.03E-13	2.37E-11	3.70E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sr-90	2.12E-07	3.13E-04	2.66E-07	2.27E-05	3.25E-04	1.30E-07	4.80E-08	5.26E-08	1.50E-03
Y-90	2.12E-07	3.13E-04	2.66E-07	2.27E-05	3.25E-04	1.31E-07	4.80E-08	5.26E-08	1.50E-03
Tc-99	0.00E+00	9.03E-09	1.01E-11	7.89E-10	1.23E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.88E-08	1.43E-08	1.56E-08	0.00E+00
Te-125m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.22E-09	3.40E-09	3.70E-09	0.00E+00
Cs-134	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.85E-12	0.00E+00	0.00E+00	0.00E+00
Cs-137	4.07E-07	5.91E-04	5.11E-07	4.31E-05	6.22E-04	5.53E-06	2.04E-06	2.22E-06	2.86E-03
Ba-137m	3.84E-07	5.58E-04	4.83E-07	4.07E-05	5.87E-04	5.22E-06	1.92E-06	2.10E-06	2.70E-03
Eu-154	2.14E-10	4.80E-07	2.21E-10	2.27E-08	2.70E-07	2.86E-09	1.05E-09	1.15E-09	1.71E-06
Eu-155	3.71E-11	1.33E-07	3.09E-11	3.94E-09	3.77E-08	1.01E-09	3.70E-10	4.06E-10	0.00E+00
Pu-238	1.78E-10	2.31E-07	2.36E-10	1.90E-08	2.88E-07	8.10E-11	0.00E+00	0.00E+00	1.21E-06
Pu-239	6.54E-11	7.98E-08	8.87E-11	6.93E-09	1.08E-07	3.04E-11	0.00E+00	0.00E+00	4.34E-07
Pu-240	6.46E-11	7.86E-08	8.80E-11	6.87E-09	1.07E-07	3.01E-11	0.00E+00	0.00E+00	4.34E-07
Pu-241	1.03E-09	1.82E-06	1.18E-09	1.09E-07	1.44E-06	4.06E-10	1.49E-10	1.63E-10	7.62E-06
Pu-242	1.07E-13	1.30E-10	1.46E-13	1.14E-11	1.78E-10	0.00E+00	3.90E-10	0.00E+00	0.00E+00
Am-241	9.80E-10	1.19E-06	1.33E-09	1.04E-07	1.62E-06	1.06E-09	0.00E+00	4.26E-10	6.54E-06
Cm-243	3.47E-12	5.10E-09	4.32E-12	3.69E-10	5.29E-09	1.48E-12	0.00E+00	0.00E+00	0.00E+00
Cm-244	1.70E-10	2.77E-07	2.01E-10	1.79E-08	2.45E-07	6.87E-11	0.00E+00	0.00E+00	1.22E-06

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Table 57 - Total Fugitive Source PTE (2 of 2)

A	B	C	D	E	F	G	H	I	J
Nuclide	Zone I&II Confinements (Ci/year)	HEPA Filters (Ci/year)	POG/VV Process Piping (Ci/year)	HLV/LLV Process Piping (Ci/year)	RLWS Piping (Ci/year)	RRLWS / CBWS Piping (Ci/year)	300-265 Transfer Line (Ci/year)	Contaminated Soil (Ci/year)	Total PTE (Ci/year)
Co-60	0.00E+00	7.77E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.96E-09	0.00E+00	8.47E-07
Se-79	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.66E-10
Sr-90	1.28E-05	2.58E-03	7.18E-05	9.52E-02	6.70E-08	6.70E-08	1.73E-05	6.62E-03	1.07E-01
Y-90	1.28E-05	2.59E-03	7.18E-05	9.52E-02	6.70E-08	6.70E-08	1.73E-05	6.62E-03	1.07E-01
Tc-99	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.34E-09	0.00E+00	3.15E-08
Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.88E-08
Te-125m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E-08
Cs-134	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.85E-12
Cs-137	2.43E-05	8.88E-05	1.37E-04	1.82E-01	1.28E-07	1.28E-07	2.57E-05	2.24E-02	2.09E-01
Ba-137m	2.30E-05	8.39E-05	1.29E-04	1.72E-01	1.21E-07	1.21E-07	2.42E-05	2.12E-02	1.98E-01
Eu-154	1.26E-08	1.29E-07	7.08E-08	7.90E-05	6.60E-11	6.60E-11	1.79E-07	0.00E+00	8.19E-05
Eu-155	2.10E-09	0.00E+00	1.19E-08	2.04E-06	1.10E-11	1.10E-11	6.48E-09	0.00E+00	2.24E-06
Pu-238	3.22E-08	7.24E-08	6.00E-08	8.41E-05	5.62E-11	5.62E-11	5.01E-07	1.30E-06	8.78E-05
Pu-239	1.18E-08	0.00E+00	2.20E-08	3.16E-05	2.06E-11	2.06E-11	8.75E-08	0.00E+00	3.24E-05
Pu-240	1.17E-08	5.89E-08	2.18E-08	3.14E-05	2.04E-11	2.04E-11	1.49E-07	0.00E+00	3.23E-05
Pu-241	6.14E-08	7.42E-07	3.46E-07	4.22E-04	3.22E-10	3.22E-10	3.84E-06	0.00E+00	4.38E-04
Pu-242	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.92E-10	0.00E+00	1.20E-09
Am-241	1.69E-07	5.78E-07	3.30E-07	4.78E-04	3.08E-10	3.08E-10	1.10E-06	8.58E-07	4.90E-04
Cm-243	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.12E-09	0.00E+00	1.29E-08
Cm-244	3.03E-08	1.55E-06	5.68E-08	7.19E-05	5.28E-11	5.28E-11	1.85E-07	9.97E-07	7.65E-05

4.0 Calculate the TEDE to the MEI

CAP88-PC, Version 4.0.1.17 was used to calculate the dose to the MEI using the PTE values calculated in Table 54 and 55 for point source emissions and Table 56 and 57 for fugitive source emissions for each radionuclide as inputs into the CAP88-PC model runs. Software quality assurance of CAP88PC, Version 4.0.1.17 is addressed by CPCC-00532 (CPCC 2023b).

The Hanford site-specific wind file for the 300 Area (a2330010.WND) was used in the CAP88-PC model run and is shown in Attachment A. The wind file is based on average data collected in the 300 Area between 2014 and 2023 at the 10-meter level.

The distances that are used in the CAP88-PC model run are shown in Attachment B and are taken from the center of the 324 Facility. By regulation [WAC 246-247-030 (15)], the MEI is any member of the public (real or hypothetical) who abides or resides in an unrestricted area, and may receive the highest TEDE from the emission unit under remediation, taking into account all exposure pathways by the radioactive emissions. For the purposes of this calculation, the MEI was assumed to be located at the Hanford site boundary at a compass bearing from the source that yielded the highest dose from all air pathways, as computed by the CAP88-PC program. Exception to this is where the Columbia River defines the site boundary. The site boundary is the west bank of the Columbia River; however, as shown on the map in Attachment B, the east bank is chosen as the closest habitable location. Also, as directed by Washington Department of Health, the Laser Interferometer Gravitational-Wave Observatory (LIGO) and the Energy Northwest Columbia Generating Station locations are considered “off-site” for the purpose of determining the location of the MEI. Distances to the site boundary were computed using the Hanford Geographic Information System (HGIS). The map shown in Attachment B reflects land which was transferred on September 30th, 2015 from the United States Department of Energy (DOE) to the Tri-City Development Council (TRIDEC).

Distances to the site boundary in 16 compass directions are input into the CAP88-PC model to show the dose at the site boundary in all directions and for potential “off-site” receptor locations. Also, distances to other potential “on-site” non-DOE related business locations (i.e., LIGO and two Energy Northwest Columbia Generating Station locations) are input into the CAP88-PC model to show the dose at these locations. However, CAP88-PC automatically calculates the "individual effective dose equivalent" for each distance in all directions

By default, CAP88-PC will take the maximum "individual effective dose equivalent" regardless of direction or distance and use it as the basis for the dose to the maximally exposed individual and report it as the "effective dose equivalent" in the nuclide specific dose equivalent summary. The result is that the maximum "individual effective dose equivalent" selected from the matrix of individual effective dose equivalents is at a location that is not on the site boundary or other “off-site” non-DOE related business location. To determine the maximum effective dose equivalent at the site boundary or non-DOE related business location, a review of the Summary Reports (Attachments C, D, E, and F) is conducted to determine which of the 16 compass directions at the site boundary or “on-site” non-DOE related business location distance inputs result in the maximum "individual effective dose equivalent". Therefore, the distance and coordinate parameters are set so that the TEDE is reported for the MEI at the site boundary or "on-site" non-DOE related business location.

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A total of four CAP88-PC software runs were performed.

1. Point Source Emissions from the Exhaust Stack evaluating 16 offsite MEIs (Attachment C)
2. Point Source Emissions from the Exhaust Stack evaluating 2 onsite MEIs (Attachment D)
3. Fugitive Source Emissions evaluating 16 offsite MEIs (Attachment E)
4. Fugitive Source Emissions evaluating 2 onsite MEIs (Attachment F)

As shown on Hanford Drawing H-3-20621, the 324 Exhaust Stack is 150 feet (45.72 meters) tall (from grade) with an inside 8 foot (2.44 meter) diameter or 4 foot (1.22m) inner radius. The stack area was calculated as 50.27 ft^2 (4.67 m^2).

Per discussions with 324 Project Engineering, the effluent flowrate has been measured to be 36,000 ft^3/min. As areas of the facility are grouted, flowrates may be reduced before eventual complete shutdown of the facility's ventilation system.

A sensitivity study was performed by running three CAP88 runs using different flowrates, 36,000 ft^3/min, 18,000 ft^3/min (50% of standard flowrate), and 9,000 ft^3/min (25% of standard flowrate). The 9,000 ft^3/min case yielded the highest TEDE to the MEI, approximately 9% greater than the 36,000 ft^3/min case. Conservatively, a flowrate of 9,000 ft^3/min will be used.

The velocity of air flow, the input required to be used in CAP88, is calculated as follows:

$$\text{Velocity, m/s} = \left(\frac{9{,}000\ \text{ft}^3}{\text{min}}\right)\left(\frac{\text{min}}{60\ \text{sec}}\right)\left(\frac{\text{m}^3}{35.31467\ \text{ft}^3}\right)\left(\frac{1}{4.67\ \text{m}^2}\right) = 0.91\ \text{m/s}$$

4.1 Assumptions

The following assumptions were assumed for CAP88-PC modeling:

- The height of lid (1000 m) is the rounded average of winter and summer mean afternoon mixing heights (500 and 2000 m respectively) for southwestern Washington, as shown on pages 32 and 34 of Holzworth, 1972. The lid is the inner layer of the atmosphere, within which there is normally a steady decrease of temperature with increasing altitude. Nearly all cloud forms and weather conditions manifest themselves within this region. Its thermal structure is caused primarily by the heating of the earth's surface by solar radiation, followed by heat transfer through turbulent mixing and convection.
- Annual precipitation (18.16 cm) is the normal annual precipitation for the Hanford Site as reported in Section 1.5.1 of DOE/RL, 2024.
- Annual ambient temperature (12.4º C) is the normal mean annual temperature for the Hanford Site as reported in Section 1.5.1 of DOE/RL, 2024.
- The default value for humidity was used, 8 g/m^3. This value was compared to Hanford specific historical data and was determined to compare well with this value.
- Decay chains were limited to 5
- Build-up time in years was set to 50 years consistent with DOE/RL, 2008
- Use of HEPA-filtered vacuums may be used throughout D4 and soil remediation of the 324 Facility to contain particulate/removable contamination. In these circumstances, the RF for this inventory will be consistent with the RF of 1E-03 chosen for that inventory and HEPA-filter vacuum activities will not be calculated separately.

- Point Source / Exhaust Stack Release
  - D4 and remediation activities which will occur within the facility prior to the exhaust stack and supporting A-Frame filters being decommissioning will last 2 years.
- Fugitive Source Emissions
  - D4 and remediation activities which will occur after the exhaust stack and supporting A-Frame filters are decommissioned will last 5 years.
  - A source height of 0m was used
  - The facility dimensions are 203 ft (61.87m) (north-south direction) by 234.5 ft (71.48m) (east-west direction) (H-3-20156). This is a source area of 47,603.5 ft^2 (4,422.5 m^2). As discussed in the CAP88 User's Guide (Trinity 2015), the ratio of distance to the receptor/source diameter is greater than 2.5; therefore, CAP88-PC automatically models the area source as a point source. CAP88 automatically assumes the source is a circular area and calculates a source diameter as follows:
    - 4,422.5 m^2 = (Diameter/2)^2 (π)

    The source diameter is calculated as 75m, which is far less than the distance to the MEI which is 1,657m away in the South Southeast direction. Therefore, the CAP88 code assumes the source to be a point source.

5.0 Results

Four CAP88 runs were performed evaluate the point source and fugitive source emissions for both the offsite and offsite MEIs. Results are shown in Table 58.

The input parameters to the CAP88-PC program were the total PTE values from Column J Table 55 for point source PTE values and Column J of Table 57 for fugitive source PTE values, the wind file data for the 300 Area from Attachment A, and the MEI distances from the 324 Facility from Attachment B.

To calculate the Abated TEDE, HEPA filters were credited to filter 99.95% of particulates, hence, 0.05% or 5E-04 was not filtered.

Table 58 – TEDE Results

	Point Source - Offsite	Point Source - Onsite	Fugitive - Offsite	Fugitive - Onsite
Unabated TEDE (mrem/yr)	9.57E+00	1.35E+00	1.45E+00	7.71E-02
Abated TEDE (mrem/yr)	4.79E-03	6.75E-04	NA	NA
MEI Location	1,657m South Southeast	13,369m Northwest	1,657m South Southeast	13,369m Northwest
CAP88 Synopsis and Summary Reports	Attachment C	Attachment D	Attachment E	Attachment F

6.0 References

Hanford Drawings

H-3-20156, Revision 3, “Architectural Key Plans”
H-3-20160, Revision 3, “Architectural Floor Plan – El 0’ 0” – Area 3”
H-3-20162, Revision 5, “Architectural Floor Plan - El 0’ 0” - Area 4”
H-3-20166, Revision 3, “Architectural Floor Plan – El 11’ 6” – Area 3”
H-3-20195, Revision 1, “Structural Concrete – Foundation & Basement Plan – Area 3”
H-3-20211, Revision 3, “Structural Concrete – Hot Metallurgical Cells – Sections & Details – Area 4”
H-3-20213, Revision 7, “Structural Concrete – Hot Pilot Cells – Area 3 – Sections & Details”
H-3-20214, Revision 6, “Structural Concrete – Hot Pilot Cells – Area 3 – Sections & Details”
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Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	A-1 of A-2		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Attachment A

300 Area Weather Station Wind File

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	A-2 of A-2		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

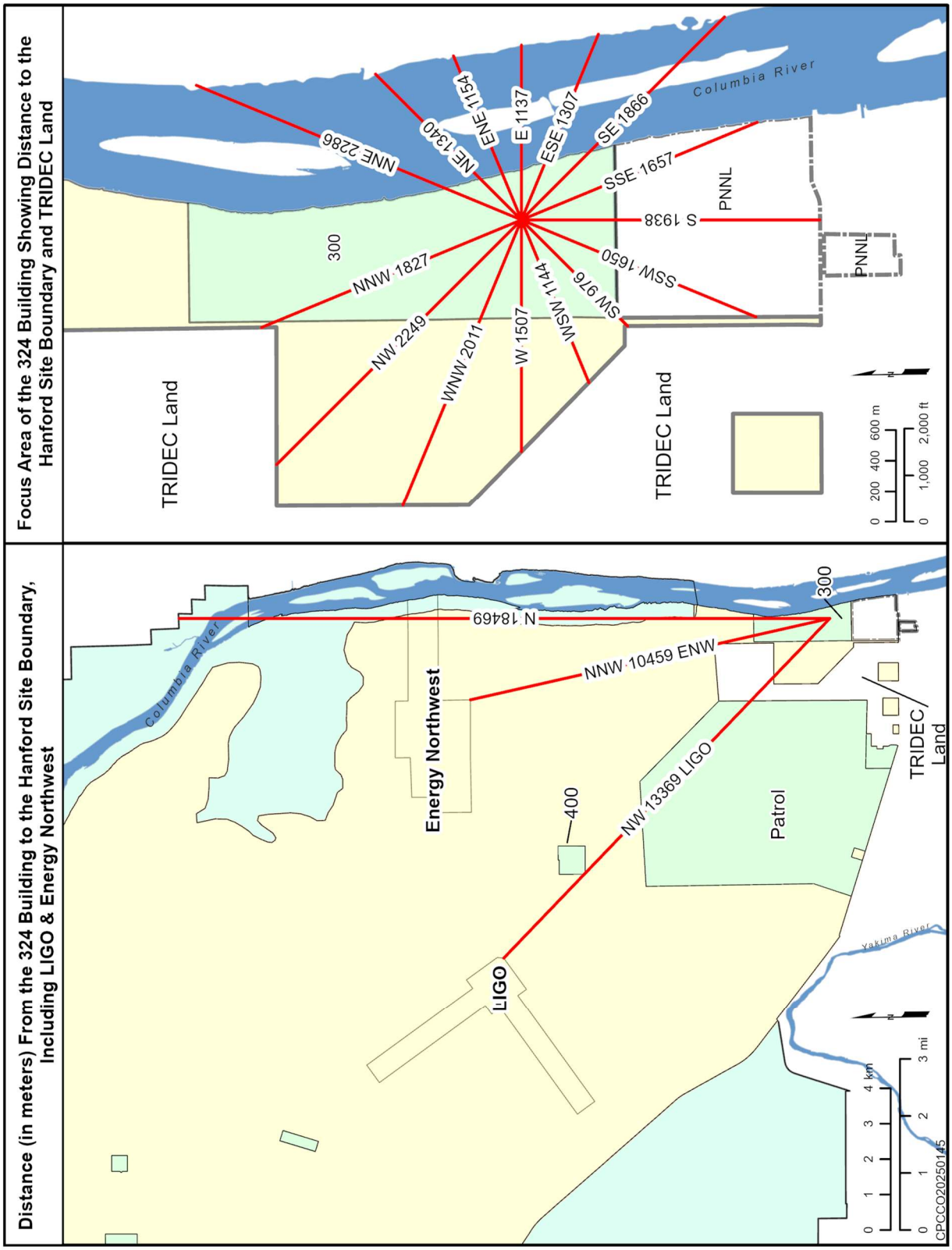
3.524
0.064 0.061 0.116 0.081 0.029 0.024 0.028 0.043 0.093 0.098 0.065 0.032 0.031 0.049 0.096 0.093
3.37 2.65 3.00 2.91 2.45 2.80 3.40 4.12 3.18 2.56 3.04 2.88 4.12 5.49 5.30 4.31
3.34 2.76 2.99 2.98 2.73 2.77 3.33 3.96 3.71 3.31 4.90 2.42 4.03 4.67 4.54 4.20
2.80 2.43 2.61 2.50 2.29 2.25 2.35 3.05 3.09 2.64 2.97 2.46 3.73 3.98 4.27 3.93
2.21 1.81 2.05 2.02 1.67 1.69 1.83 2.28 2.51 2.51 2.34 1.68 1.97 2.74 3.61 3.17
1.97 1.75 1.98 1.97 1.36 1.37 1.53 2.07 2.51 2.29 2.06 1.51 1.63 2.20 3.00 2.66
1.66 1.64 2.08 2.06 1.25 1.12 1.19 1.50 2.23 1.84 1.35 1.16 1.17 1.45 2.16 2.09
1.67 1.62 2.06 1.92 1.03 1.00 1.04 1.44 2.15 1.76 1.27 1.16 1.04 1.26 2.06 2.05
4.21 3.44 3.67 3.51 2.96 3.28 4.25 5.26 5.00 4.36 5.55 4.94 6.53 7.05 6.38 5.55
4.04 3.51 3.54 3.44 3.00 3.07 3.87 4.69 4.97 4.91 6.69 4.02 6.95 6.40 5.73 5.07
3.62 3.09 3.20 3.03 2.78 2.83 3.13 4.09 4.31 4.26 5.54 3.79 6.17 5.84 5.50 4.83
3.36 2.58 2.71 2.66 2.27 2.34 2.73 3.53 3.80 3.99 4.37 3.31 4.09 5.09 5.60 4.81
3.06 2.56 2.60 2.58 1.87 2.26 3.32 3.61 3.61 3.51 3.68 2.48 2.89 4.00 5.23 4.41
2.46 2.19 2.62 2.74 1.76 1.70 2.15 2.43 3.28 2.73 1.98 1.55 1.65 2.59 3.88 3.45
2.60 2.20 2.70 2.76 1.24 1.18 1.28 2.25 3.25 2.52 1.76 1.50 1.27 2.23 4.46 3.62
0.0343 0.0452 0.0593 0.2293 0.3651 0.2090 0.0577
0.0312 0.0411 0.0575 0.1970 0.3186 0.2627 0.0920
0.0303 0.0407 0.0649 0.2067 0.2742 0.2811 0.1021
0.0422 0.0683 0.0857 0.2435 0.2584 0.2273 0.0745
0.0764 0.1250 0.1528 0.3194 0.1771 0.1146 0.0347
0.1021 0.1489 0.1915 0.3021 0.1404 0.0894 0.0255
0.1449 0.1304 0.1558 0.2862 0.1413 0.1087 0.0326
0.1253 0.0974 0.1114 0.2854 0.2158 0.1206 0.0441
0.0290 0.0226 0.0387 0.2481 0.3663 0.2073 0.0881
0.0236 0.0123 0.0205 0.3023 0.3760 0.1967 0.0686
0.0325 0.0108 0.0217 0.2988 0.3885 0.1811 0.0666
0.0413 0.0159 0.0190 0.2286 0.4254 0.1968 0.0730
0.0548 0.0355 0.0387 0.2677 0.3968 0.1613 0.0452
0.1059 0.0611 0.0672 0.2749 0.3442 0.1202 0.0265
0.1016 0.0712 0.0806 0.2545 0.3560 0.1089 0.0272
0.0723 0.0712 0.0949 0.2503 0.3355 0.1402 0.0356
extended data
StationName=300AREA(Station 11)-10 M - Pasquill A - G (2014-23)
State=WA
Latitude=46.36425
Longitude=-119.28617
TimeZone=8
RecordPeriod=10y(2014-23)
AveragePeriodTemperature=12.9
Comments=Formatted 9/19/24 SFS, Created 9/5/24 PJP. Windspeed Classes (m/s):.89 2.65 4.7 7.15 9.8 12.7 15.6 19.0

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	B-1 of B-2		
Subject	Total Effective Dose Equivalent Calculation for the D4 of the 324 Facility						

Attachment B

Map showing distance to the MEI from the 324 Facility

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	B-2 of B-2		
Subject	Total Effective Dose Equivalent Calculation for the D4 of the 324 Facility						



Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	C-1 of C-16		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Attachment C

CAP88 Synopsis and Summary Report – Stack/Point Source Emissions -Offsite MEIs

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	C-2 of C-16		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

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C A P 8 8 - P C
Version 4.0

Clean Air Act Assessment Package - 1988

S Y N O P S I S   R E P O R T

Non-Radon Individual Assessment
Thu Jun 12 11:32:14 2025

Facility:  324 Facility D&D
 Address:
    City:  Richland
   State:  WA          Zip:

Source Category:
    Source Type:  Stack
  Emission Year:  2025
 DOSE Age Group:  Adult

Comments:  Point Source Exhuast Stack Emissions
           2025 TEDE Calculation - 9K CFM - 25% Flowrate

        Committed Effective Dose Equivalent
                      (mrem)
        ____________________________________
                    9.57E+00
        ____________________________________
At This Location:   1657 Meters South Southeast

Dataset Name:  324-Point-9K.
Dataset Date:  Jun 12, 2025 11:32 AM
   Wind File:  C:\Users\h0110065\OneDrive - HANFORD\Documents\CAP88\Wi
```

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	C-3 of C-16		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Thu Jun 12 11:32:14 2025 SYNOPSIS
Page 1

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 1657 Meters South Southeast
Lifetime Fatal Cancer Risk: 1.86E-06

ORGAN DOSE EQUIVALENT SUMMARY
(RN-222 Working Level Calculations Excluded)

Organ	Dose Equivalent (mrem)
Adrenal	6.34E+00
UB_Wall	6.72E+00
Bone_Sur	5.23E+01
Brain	5.93E+00
Breasts	6.12E+00
St_Wall	6.36E+00
SI_Wall	6.47E+00
ULI_Wall	7.03E+00
LLI_Wall	9.08E+00
Kidneys	6.43E+00
Liver	7.21E+00
Muscle	6.54E+00
Ovaries	6.77E+00
Pancreas	6.37E+00
R_Marrow	2.23E+01
Skin	4.48E+01
Spleen	6.39E+00
Testes	6.76E+00
Thymus	6.26E+00
Thyroid	6.57E+00
GB_Wall	6.32E+00
Ht_Wall	6.42E+00
Uterus	6.52E+00
ET_Reg	6.07E+00
Lung_66	6.62E+00
Effectiv	9.57E+00

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	C-4 of C-16		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

RADIONUCLIDE EMISSIONS DURING THE YEAR 2025

Nuclide	Type	Size	Source #1 Ci/y	TOTAL Ci/y
Co-60	M	1.000	2.6E-06	2.6E-06
Se-79	F	1.000	2.5E-08	2.5E-08
Sr-90	M	1.000	2.8E+00	2.8E+00
Y-90	M	1.000	2.8E+00	2.8E+00
Tc-99	M	1.000	8.3E-07	8.3E-07
Te-125m	M	1.000	5.8E-08	5.8E-08
Cs-134	F	1.000	7.3E-11	7.3E-11
Cs-137	F	1.000	5.3E+00	5.3E+00
Ba-137m	B	0.000	5.0E+00	5.0E+00
Eu-154	M	1.000	2.3E-03	2.3E-03
Eu-155	M	1.000	2.1E-05	2.1E-05
Pu-238	M	1.000	2.4E-03	2.4E-03
Pu-239	M	1.000	9.1E-04	9.1E-04
Pu-240	M	1.000	9.1E-04	9.1E-04
Pu-241	M	1.000	1.2E-02	1.2E-02
Pu-242	M	1.000	7.3E-09	7.3E-09
Am-241	M	1.000	1.4E-02	1.4E-02
Cm-243	M	1.000	4.0E-07	4.0E-07
Cm-244	M	1.000	2.1E-03	2.1E-03
Sb-125	M	1.000	2.4E-07	2.4E-07

SITE INFORMATION

Temperature: 12.400 degrees C
Precipitation: 18.160 cm/y
Humidity: 8.000 g/cu m
Mixing Height: 1000.0 m

User specified location of max exposed individual.
(ILOC, JLOC): SSE, 1657 meters

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	C-5 of C-16		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

SOURCE INFORMATION

Source Number: 1

Stack Height (m): 45.72
Diameter (m): 2.44

Plume Rise
Momentum (m/s): 0.91
(Exit Velocity)

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	1.0000	1.0000	1.0000
Fraction From Assessment Area:	0.0000	0.0000	0.0000
Fraction Imported:	0.0000	0.0000	0.0000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES (M) USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

976 1137 1144 1154 1307 1340 1507
1650 1657 1827 1866 1938 2011 2249
2286 18469

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	C-6 of C-16		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

D O S E A N D R I S K S U M M A R I E S

Non-Radon Individual Assessment
Thu Jun 12 11:32:14 2025

Facility: 324 Facility D&D
Address:
City: Richland
State: WA Zip:

Source Category:
Source Type: Stack
Emission Year: 2025
DOSE Age Group: Adult

Comments: Point Source Exhaust Stack Emissions
2025 TEDE Calculation - 9K CFM - 25% Flowrate

Dataset Name: 324-Point-9K.
Dataset Date: Jun 12, 2025 11:32 AM
Wind File: C:\Users\h0110065\OneDrive - HANFORD\Documents\CAP88\Wind Files\a2330010.wnd

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	C-7 of C-16		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Thu Jun 12 11:32:14 2025 SUMMARY
Page 1

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)
Adrenal	6.34E+00
UB_Wall	6.72E+00
Bone_Sur	5.23E+01
Brain	5.93E+00
Breasts	6.12E+00
St_Wall	6.36E+00
SI_Wall	6.47E+00
ULI_Wall	7.03E+00
LLI_Wall	9.08E+00
Kidneys	6.43E+00
Liver	7.21E+00
Muscle	6.54E+00
Ovaries	6.77E+00
Pancreas	6.37E+00
R_Marrow	2.23E+01
Skin	4.48E+01
Spleen	6.39E+00
Testes	6.76E+00
Thymus	6.26E+00
Thyroid	6.57E+00
GB_Wall	6.32E+00
Ht_Wall	6.42E+00
Uterus	6.52E+00
ET_Reg	6.07E+00
Lung_66	6.62E+00
Effectiv	9.57E+00

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)
INGESTION	5.84E+00
INHALATION	2.52E-01
AIR IMMERSION	2.21E-04
GROUND SURFACE	3.47E+00
INTERNAL	6.09E+00
EXTERNAL	3.47E+00
TOTAL	9.57E+00

NUCLIDE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem)
Co-60	2.32E-06
Se-79	5.28E-09
Sr-90	2.44E+00
Y-90	3.26E-01
Tc-99	1.22E-07
Te-125m	4.49E-10
Cs-134	4.56E-11
Cs-137	3.45E+00
Ba-137m	3.13E+00
Eu-154	1.45E-03
Eu-155	4.05E-07
Pu-238	3.01E-02
U-234	1.24E-10
Th-230	1.96E-14
Ra-226	1.06E-15
Rn-222	5.90E-17
Po-218	1.05E-21
Pb-214	3.85E-14
At-218	3.96E-21
Bi-214	2.25E-13
Rn-218	2.30E-23
Po-214	1.25E-17
Tl-210	8.79E-17
Pb-210	8.29E-17
Bi-210	1.34E-15
Hg-206	1.08E-22
Po-210	3.34E-19
Tl-206	3.13E-21
Pu-239	1.23E-02
U-235m	0.00E+00
U-235	4.68E-12
Th-231	4.77E-13
Pa-231	3.50E-16
Ac-227	6.82E-19
Th-227	3.24E-16
Fr-223	3.07E-18
Ra-223	3.62E-16
Rn-219	1.57E-16

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	C-9 of C-16		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

At-219	0.00E+00
Bi-215	7.10E-22
Po-215	4.79E-19
Pb-211	3.08E-16
Bi-211	1.27E-16
Tl-207	1.59E-16
Po-211	6.11E-20
Pu-240	1.22E-02
U-236	4.53E-13
Th-232	3.19E-22
Ra-228	3.21E-22
Ac-228	3.67E-19
Th-228	7.80E-22
Ra-224	3.46E-21
Rn-220	2.17E-22
Po-216	5.23E-24
Pb-212	4.76E-20
Bi-212	5.55E-20
Po-212	0.00E+00
Tl-208	3.84E-19
Pu-241	3.01E-03
Am-241	1.55E-01
U-237	2.76E-08
Np-237	3.77E-09
Pa-233	3.10E-08
U-233	4.84E-15
Th-229	8.80E-16
Ra-225	1.24E-16
Ac-225	1.49E-16
Fr-221	3.03E-16
At-217	2.55E-18
Bi-213	1.85E-15
Po-213	3.93E-19
Tl-209	4.75E-16
Pb-209	3.59E-17
Pu-242	9.36E-08
U-238	1.55E-20
Th-234	3.23E-19
Pa-234m	4.42E-18
Pa-234	8.71E-20
Cm-243	3.40E-06
Am-243	1.13E-13
Np-239	3.70E-13
Cm-244	1.46E-02
Sb-125	2.06E-08
TOTAL	9.57E+00

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	C-10 of C-16		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Thu Jun 12 11:32:14 2025 SUMMARY
Page 3

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	9.80E-08
INHALATION	2.71E-08
AIR IMMERSION	1.19E-10
GROUND SURFACE	1.73E-06
INTERNAL	1.25E-07
EXTERNAL	1.73E-06
TOTAL	1.86E-06

Thu Jun 12 11:32:14 2025 SUMMARY
Page 4

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
Co-60	1.18E-12
Se-79	6.72E-17
Sr-90	5.28E-08
Y-90	3.90E-08
Tc-99	2.14E-15
Te-125m	3.57E-16
Cs-134	1.05E-17
Cs-137	5.74E-08
Ba-137m	1.69E-06
Eu-154	7.90E-10
Eu-155	2.32E-13
Pu-238	2.58E-09
U-234	4.28E-17
Th-230	8.33E-21
Ra-226	5.76E-22
Rn-222	3.22E-23
Po-218	4.71E-28
Pb-214	2.06E-20
At-218	4.88E-28
Bi-214	1.19E-19
Rn-218	1.26E-29
Po-214	6.85E-24
Tl-210	4.70E-23
Pb-210	3.71E-23
Bi-210	1.48E-22
Hg-206	4.80E-29
Po-210	1.83E-25
Tl-206	3.51E-28
Pu-239	9.11E-10
U-235m	0.00E+00
U-235	2.53E-18
Th-231	2.18E-19
Pa-231	1.83E-22
Ac-227	2.55E-25
Th-227	1.76E-22
Fr-223	1.14E-24
Ra-223	1.96E-22
Rn-219	8.58E-23
At-219	0.00E+00
Bi-215	3.17E-28

Po-215	2.63E-25
Pb-211	1.10E-22
Bi-211	6.93E-23
Tl-207	2.05E-23
Po-211	3.34E-26
Pu-240	9.56E-10
U-236	1.48E-19
Th-232	1.25E-28
Ra-228	9.76E-29
Ac-228	1.95E-25
Th-228	3.90E-28
Ra-224	1.89E-27
Rn-220	1.19E-28
Po-216	2.87E-30
Pb-212	2.59E-26
Bi-212	2.14E-26
Po-212	0.00E+00
Tl-208	2.09E-25
Pu-241	1.31E-10
Am-241	1.17E-08
U-237	1.46E-14
Np-237	1.85E-15
Pa-233	1.67E-14
U-233	1.99E-21
Th-229	4.65E-22
Ra-225	5.62E-23
Ac-225	7.82E-23
Fr-221	1.64E-22
At-217	1.40E-24
Bi-213	7.99E-22
Po-213	2.15E-25
Tl-209	2.54E-22
Pb-209	4.73E-24
Pu-242	7.32E-15
U-238	5.08E-27
Th-234	1.67E-25
Pa-234m	7.73E-25
Pa-234	4.73E-26
Cm-243	3.49E-13
Am-243	5.91E-20
Np-239	1.98E-19
Cm-244	1.57E-09
Sb-125	1.09E-14
TOTAL	1.86E-06

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	C-13 of C-16		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

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INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	976	1137	1144	1154	1307	1340	1507
N	8.4E+00	8.0E+00	8.0E+00	8.0E+00	7.6E+00	7.5E+00	7.0E+00
NNW	8.3E+00	7.9E+00	7.9E+00	7.9E+00	7.4E+00	7.3E+00	6.9E+00
NW	1.4E+01	1.3E+01	1.3E+01	1.3E+01	1.2E+01	1.2E+01	1.1E+01
WNW	1.1E+01	1.0E+01	1.0E+01	9.9E+00	9.2E+00	9.1E+00	8.4E+00
W	5.6E+00	5.1E+00	5.0E+00	5.0E+00	4.5E+00	4.5E+00	4.0E+00
WSW	4.6E+00	4.1E+00	4.1E+00	4.0E+00	3.6E+00	3.6E+00	3.2E+00
SW	4.7E+00	4.2E+00	4.2E+00	4.1E+00	3.7E+00	3.6E+00	3.3E+00
SSW	5.7E+00	5.2E+00	5.2E+00	5.2E+00	4.7E+00	4.6E+00	4.2E+00
S	1.0E+01	9.8E+00	9.7E+00	9.7E+00	9.2E+00	9.1E+00	8.5E+00
SSE	1.2E+01	1.2E+01	1.2E+01	1.2E+01	1.1E+01	1.1E+01	1.0E+01
SE	8.8E+00	8.5E+00	8.5E+00	8.5E+00	8.1E+00	8.0E+00	7.5E+00
ESE	5.4E+00	5.3E+00	5.3E+00	5.3E+00	5.0E+00	5.0E+00	4.7E+00
E	4.9E+00	4.8E+00	4.8E+00	4.7E+00	4.5E+00	4.5E+00	4.2E+00
ENE	5.9E+00	5.6E+00	5.6E+00	5.5E+00	5.2E+00	5.1E+00	4.8E+00
NE	9.0E+00	8.5E+00	8.4E+00	8.4E+00	7.9E+00	7.7E+00	7.2E+00
NNE	9.6E+00	9.0E+00	9.0E+00	9.0E+00	8.4E+00	8.2E+00	7.6E+00

	Distance (m)						
Direction	1650	1657	1827	1866	1938	2011	2249
N	6.6E+00	6.6E+00	6.2E+00	6.1E+00	6.0E+00	5.8E+00	5.3E+00
NNW	6.5E+00	6.5E+00	6.1E+00	6.0E+00	5.9E+00	5.8E+00	5.3E+00
NW	1.1E+01	1.0E+01	9.8E+00	9.7E+00	9.4E+00	9.2E+00	8.5E+00
WNW	7.8E+00	7.8E+00	7.3E+00	7.1E+00	6.9E+00	6.7E+00	6.1E+00
W	3.7E+00	3.7E+00	3.4E+00	3.3E+00	3.2E+00	3.1E+00	2.8E+00
WSW	2.9E+00	2.9E+00	2.6E+00	2.6E+00	2.5E+00	2.4E+00	2.1E+00
SW	3.0E+00	3.0E+00	2.7E+00	2.7E+00	2.6E+00	2.5E+00	2.2E+00
SSW	3.9E+00	3.9E+00	3.6E+00	3.5E+00	3.4E+00	3.3E+00	3.0E+00
S	8.0E+00	8.0E+00	7.5E+00	7.4E+00	7.2E+00	7.0E+00	6.4E+00
SSE	9.6E+00	9.6E+00	9.0E+00	8.8E+00	8.6E+00	8.4E+00	7.7E+00
SE	7.1E+00	7.1E+00	6.6E+00	6.5E+00	6.4E+00	6.2E+00	5.7E+00
ESE	4.5E+00	4.5E+00	4.2E+00	4.2E+00	4.0E+00	3.9E+00	3.6E+00
E	4.0E+00	4.0E+00	3.7E+00	3.7E+00	3.6E+00	3.5E+00	3.2E+00
ENE	4.5E+00	4.5E+00	4.2E+00	4.1E+00	4.0E+00	3.9E+00	3.5E+00
NE	6.7E+00	6.7E+00	6.2E+00	6.1E+00	5.9E+00	5.7E+00	5.2E+00
NNE	7.2E+00	7.1E+00	6.6E+00	6.5E+00	6.3E+00	6.1E+00	5.6E+00

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	C-14 of C-16		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

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INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radionuclides and Pathways)

	Distance (m)	
Direction	2286	18469
N	5.3E+00	5.4E-01
NNW	5.3E+00	5.7E-01
NW	8.4E+00	9.2E-01
WNW	6.1E+00	6.0E-01
W	2.7E+00	2.2E-01
WSW	2.1E+00	1.6E-01
SW	2.2E+00	1.9E-01
SSW	2.9E+00	2.7E-01
S	6.3E+00	6.5E-01
SSE	7.6E+00	7.7E-01
SE	5.6E+00	5.8E-01
ESE	3.6E+00	3.6E-01
E	3.1E+00	3.1E-01
ENE	3.5E+00	3.3E-01
NE	5.1E+00	4.9E-01
NNE	5.5E+00	5.3E-01

- Underlined number is the TEDE value to the MEI at the Hanford Site Boundary
- Shaded number is the overall maximum value to the MEI at the Hanford Site Boundary.

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	C-15 of C-16		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

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INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	976	1137	1144	1154	1307	1340	1507
N	1.6E-06	1.6E-06	1.6E-06	1.6E-06	1.5E-06	1.4E-06	1.4E-06
NNW	1.6E-06	1.5E-06	1.5E-06	1.5E-06	1.4E-06	1.4E-06	1.3E-06
NW	2.7E-06	2.5E-06	2.5E-06	2.5E-06	2.3E-06	2.3E-06	2.2E-06
WNW	2.1E-06	1.9E-06	1.9E-06	1.9E-06	1.8E-06	1.8E-06	1.6E-06
W	1.1E-06	9.8E-07	9.8E-07	9.7E-07	8.8E-07	8.7E-07	7.8E-07
WSW	8.9E-07	7.9E-07	7.9E-07	7.9E-07	7.1E-07	6.9E-07	6.2E-07
SW	9.1E-07	8.1E-07	8.1E-07	8.0E-07	7.2E-07	7.1E-07	6.4E-07
SSW	1.1E-06	1.0E-06	1.0E-06	1.0E-06	9.2E-07	9.0E-07	8.2E-07
S	2.0E-06	1.9E-06	1.9E-06	1.9E-06	1.8E-06	1.8E-06	1.6E-06
SSE	2.3E-06	2.3E-06	2.3E-06	2.2E-06	2.1E-06	2.1E-06	2.0E-06
SE	1.7E-06	1.7E-06	1.7E-06	1.6E-06	1.6E-06	1.5E-06	1.5E-06
ESE	1.1E-06	1.0E-06	1.0E-06	1.0E-06	9.8E-07	9.7E-07	9.1E-07
E	9.6E-07	9.3E-07	9.2E-07	9.2E-07	8.8E-07	8.7E-07	8.2E-07
ENE	1.1E-06	1.1E-06	1.1E-06	1.1E-06	1.0E-06	1.0E-06	9.3E-07
NE	1.8E-06	1.6E-06	1.6E-06	1.6E-06	1.5E-06	1.5E-06	1.4E-06
NNE	1.9E-06	1.8E-06	1.7E-06	1.7E-06	1.6E-06	1.6E-06	1.5E-06

	Distance (m)						
Direction	1650	1657	1827	1866	1938	2011	2249
N	1.3E-06	1.3E-06	1.2E-06	1.2E-06	1.2E-06	1.1E-06	1.0E-06
NNW	1.3E-06	1.3E-06	1.2E-06	1.2E-06	1.1E-06	1.1E-06	1.0E-06
NW	2.0E-06	2.0E-06	1.9E-06	1.9E-06	1.8E-06	1.8E-06	1.7E-06
WNW	1.5E-06	1.5E-06	1.4E-06	1.4E-06	1.3E-06	1.3E-06	1.2E-06
W	7.2E-07	7.2E-07	6.6E-07	6.5E-07	6.2E-07	6.0E-07	5.4E-07
WSW	5.7E-07	5.7E-07	5.1E-07	5.0E-07	4.8E-07	4.7E-07	4.1E-07
SW	5.9E-07	5.8E-07	5.3E-07	5.2E-07	5.0E-07	4.9E-07	4.3E-07
SSW	7.6E-07	7.6E-07	7.0E-07	6.9E-07	6.6E-07	6.4E-07	5.8E-07
S	1.6E-06	1.6E-06	1.5E-06	1.4E-06	1.4E-06	1.4E-06	1.2E-06
SSE	1.9E-06	1.9E-06	1.7E-06	1.7E-06	1.7E-06	1.6E-06	1.5E-06
SE	1.4E-06	1.4E-06	1.3E-06	1.3E-06	1.2E-06	1.2E-06	1.1E-06
ESE	8.7E-07	8.7E-07	8.2E-07	8.1E-07	7.9E-07	7.7E-07	7.1E-07
E	7.7E-07	7.7E-07	7.2E-07	7.1E-07	6.9E-07	6.7E-07	6.2E-07
ENE	8.7E-07	8.7E-07	8.1E-07	8.0E-07	7.7E-07	7.5E-07	6.9E-07
NE	1.3E-06	1.3E-06	1.2E-06	1.2E-06	1.1E-06	1.1E-06	1.0E-06
NNE	1.4E-06	1.4E-06	1.3E-06	1.3E-06	1.2E-06	1.2E-06	1.1E-06

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	C-16 of C-16		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Thu Jun 12 11:32:14 2025 SUMMARY
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INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)	
Direction	2286	18469
N	1.0E-06	1.1E-07
NNW	1.0E-06	1.1E-07
NW	1.6E-06	1.8E-07
WNW	1.2E-06	1.2E-07
W	5.3E-07	4.3E-08
WSW	4.1E-07	3.2E-08
SW	4.3E-07	3.6E-08
SSW	5.7E-07	5.2E-08
S	1.2E-06	1.3E-07
SSE	1.5E-06	1.5E-07
SE	1.1E-06	1.1E-07
ESE	7.0E-07	7.1E-08
E	6.1E-07	6.0E-08
ENE	6.8E-07	6.5E-08
NE	1.0E-06	9.5E-08
NNE	1.1E-06	1.0E-07

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	D-1 of D-14		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Attachment D

CAP88 Synopsis and Summary Report – Stack/Point Source Emissions -Onsite MEIs

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	D-2 of D-14		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

C A P 8 8 - P C

Version 4.0

Clean Air Act Assessment Package - 1988

S Y N O P S I S R E P O R T

Non-Radon Individual Assessment
Thu Jun 12 11:46:09 2025

Facility: 324 Facility D&D
Address:
City: Richland
State: WA Zip:

Source Category:
Source Type: Stack
Emission Year: 2025
DOSE Age Group: Adult

Comments: Point Source Exhaust Stack Emissions - Onsite MEIs
2025 TEDE Calculation - 9K CFM - 25% Flowrate

Committed Effective Dose Equivalent
(mrem)

1.35E+00

At This Location: 13369 Meters Northwest

Dataset Name: 324-Point-9K-On.
Dataset Date: Jun 12, 2025 11:46 AM
Wind File: C:\Users\h0110065\OneDrive - HANFORD\Documents\CAP88\Wi

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	D-3 of D-14		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Thu Jun 12 11:46:09 2025 SYNOPSIS
Page 1

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 13369 Meters Northwest
Lifetime Fatal Cancer Risk: 2.62E-07

ORGAN DOSE EQUIVALENT SUMMARY
(RN-222 Working Level Calculations Excluded)

Organ	Dose Equivalent (mrem)
Adrenal	8.93E-01
UB_Wall	9.47E-01
Bone_Sur	7.37E+00
Brain	8.36E-01
Breasts	8.62E-01
St_Wall	8.97E-01
SI_Wall	9.12E-01
ULI_Wall	9.91E-01
LLI_Wall	1.28E+00
Kidneys	9.06E-01
Liver	1.02E+00
Muscle	9.22E-01
Ovaries	9.53E-01
Pancreas	8.97E-01
R_Marrow	3.15E+00
Skin	6.31E+00
Spleen	9.00E-01
Testes	9.53E-01
Thymus	8.82E-01
Thyroid	9.26E-01
GB_Wall	8.90E-01
Ht_Wall	9.04E-01
Uterus	9.18E-01
ET_Reg	8.56E-01
Lung_66	9.33E-01
Effectiv	1.35E+00

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	D-4 of D-14		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

RADIONUCLIDE EMISSIONS DURING THE YEAR 2025

Nuclide	Type	Size	Source #1 Ci/y	TOTAL Ci/y
Co-60	M	1.000	2.6E-06	2.6E-06
Se-79	F	1.000	2.5E-08	2.5E-08
Sr-90	M	1.000	2.8E+00	2.8E+00
Y-90	M	1.000	2.8E+00	2.8E+00
Tc-99	M	1.000	8.3E-07	8.3E-07
Te-125m	M	1.000	5.8E-08	5.8E-08
Cs-134	F	1.000	7.3E-11	7.3E-11
Cs-137	F	1.000	5.3E+00	5.3E+00
Ba-137m	B	0.000	5.0E+00	5.0E+00
Eu-154	M	1.000	2.3E-03	2.3E-03
Eu-155	M	1.000	2.1E-05	2.1E-05
Pu-238	M	1.000	2.4E-03	2.4E-03
Pu-239	M	1.000	9.1E-04	9.1E-04
Pu-240	M	1.000	9.1E-04	9.1E-04
Pu-241	M	1.000	1.2E-02	1.2E-02
Pu-242	M	1.000	7.3E-09	7.3E-09
Am-241	M	1.000	1.4E-02	1.4E-02
Cm-243	M	1.000	4.0E-07	4.0E-07
Cm-244	M	1.000	2.1E-03	2.1E-03
Sb-125	M	1.000	2.4E-07	2.4E-07

SITE INFORMATION

Temperature: 12.400 degrees C
Precipitation: 18.160 cm/y
Humidity: 8.000 g/cu m
Mixing Height: 1000.0 m

User specified location of max exposed individual.
(ILOC, JLOC): NW ,13369 meters

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	D-5 of D-14		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

SOURCE INFORMATION

Source Number: 1

Stack Height (m): 45.72
Diameter (m): 2.44

Plume Rise
Momentum (m/s): 0.91
(Exit Velocity)

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	1.0000	1.0000	1.0000
Fraction From Assessment Area:	0.0000	0.0000	0.0000
Fraction Imported:	0.0000	0.0000	0.0000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES (M) USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

10459 13369

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	D-6 of D-14		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

D O S E A N D R I S K S U M M A R I E S

Non-Radon Individual Assessment
Thu Jun 12 11:46:09 2025

Facility: 324 Facility D&D
Address:
City: Richland
State: WA Zip:

Source Category:
Source Type: Stack
Emission Year: 2025
DOSE Age Group: Adult

Comments: Point Source Exhuast Stack Emissions - Onsite MEIs
2025 TEDE Calculation - 9K CFM - 25% Flowrate

Dataset Name: 324-Point-9K-On.
Dataset Date: Jun 12, 2025 11:46 AM
Wind File: C:\Users\h0110065\OneDrive - HANFORD\Documents\CAP88\Wind Files\a2330010.wnd

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	D-7 of D-14		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

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Page 1

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)
Adrenal	8.93E-01
UB_Wall	9.47E-01
Bone_Sur	7.37E+00
Brain	8.36E-01
Breasts	8.62E-01
St_Wall	8.97E-01
SI_Wall	9.12E-01
ULI_Wall	9.91E-01
LLI_Wall	1.28E+00
Kidneys	9.06E-01
Liver	1.02E+00
Muscle	9.22E-01
Ovaries	9.53E-01
Pancreas	8.97E-01
R_Marrow	3.15E+00
Skin	6.31E+00
Spleen	9.00E-01
Testes	9.53E-01
Thymus	8.82E-01
Thyroid	9.26E-01
GB_Wall	8.90E-01
Ht_Wall	9.04E-01
Uterus	9.18E-01
ET_Reg	8.56E-01
Lung_66	9.33E-01
Effectiv	1.35E+00

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)
INGESTION	8.23E-01
INHALATION	3.54E-02
AIR IMMERSION	3.11E-05
GROUND SURFACE	4.90E-01
INTERNAL	8.58E-01
EXTERNAL	4.90E-01
TOTAL	1.35E+00

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	D-8 of D-14		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Thu Jun 12 11:46:09 2025 SUMMARY
Page 2

NUCLIDE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem)
Co-60	3.26E-07
Se-79	7.44E-10
Sr-90	3.43E-01
Y-90	4.59E-02
Tc-99	1.72E-08
Te-125m	6.33E-11
Cs-134	6.43E-12
Cs-137	4.86E-01
Ba-137m	4.40E-01
Eu-154	2.04E-04
Eu-155	5.71E-08
Pu-238	4.24E-03
U-234	1.76E-11
Th-230	2.76E-15
Ra-226	1.49E-16
Rn-222	8.31E-18
Po-218	1.49E-22
Pb-214	5.43E-15
At-218	5.59E-22
Bi-214	3.17E-14
Rn-218	3.24E-24
Po-214	1.76E-18
Tl-210	1.24E-17
Pb-210	1.17E-17
Bi-210	1.89E-16
Hg-206	1.52E-23
Po-210	4.70E-20
Tl-206	4.40E-22
Pu-239	1.73E-03
U-235m	0.00E+00
U-235	6.59E-13
Th-231	6.72E-14
Pa-231	4.93E-17
Ac-227	9.61E-20
Th-227	4.57E-17
Fr-223	4.33E-19
Ra-223	5.10E-17
Rn-219	2.21E-17
At-219	0.00E+00
Bi-215	1.00E-22

Po-215	6.75E-20
Pb-211	4.34E-17
Bi-211	1.79E-17
Tl-207	2.25E-17
Po-211	8.60E-21
Pu-240	1.72E-03
U-236	6.44E-14
Th-232	4.49E-23
Ra-228	4.53E-23
Ac-228	5.17E-20
Th-228	1.10E-22
Ra-224	4.88E-22
Rn-220	3.05E-23
Po-216	7.37E-25
Pb-212	6.71E-21
Bi-212	7.82E-21
Po-212	0.00E+00
Tl-208	5.40E-20
Pu-241	4.24E-04
Am-241	2.17E-02
U-237	3.88E-09
Np-237	5.32E-10
Pa-233	4.37E-09
U-233	6.82E-16
Th-229	1.24E-16
Ra-225	1.75E-17
Ac-225	2.09E-17
Fr-221	4.27E-17
At-217	3.60E-19
Bi-213	2.60E-16
Po-213	5.54E-20
Tl-209	6.70E-17
Pb-209	5.06E-18
Pu-242	1.32E-08
U-238	2.20E-21
Th-234	4.55E-20
Pa-234m	6.22E-19
Pa-234	1.23E-20
Cm-243	4.78E-07
Am-243	1.60E-14
Np-239	5.21E-14
Cm-244	2.05E-03
Sb-125	2.90E-09
TOTAL	1.35E+00

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	D-10 of D-14		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

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Page 3

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	1.38E-08
INHALATION	3.81E-09
AIR IMMERSION	1.68E-11
GROUND SURFACE	2.44E-07
INTERNAL	1.76E-08
EXTERNAL	2.44E-07
TOTAL	2.62E-07

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	D-11 of D-14		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

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NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
Co-60	1.66E-13
Se-79	9.46E-18
Sr-90	7.44E-09
Y-90	5.50E-09
Tc-99	3.01E-16
Te-125m	5.02E-17
Cs-134	1.47E-18
Cs-137	8.09E-09
Ba-137m	2.38E-07
Eu-154	1.11E-10
Eu-155	3.26E-14
Pu-238	3.63E-10
U-234	6.08E-18
Th-230	1.17E-21
Ra-226	8.12E-23
Rn-222	4.54E-24
Po-218	6.64E-29
Pb-214	2.90E-21
At-218	6.88E-29
Bi-214	1.68E-20
Rn-218	1.77E-30
Po-214	9.65E-25
Tl-210	6.62E-24
Pb-210	5.23E-24
Bi-210	2.09E-23
Hg-206	6.76E-30
Po-210	2.58E-26
Tl-206	4.95E-29
Pu-239	1.28E-10
U-235m	0.00E+00
U-235	3.57E-19
Th-231	3.07E-20
Pa-231	2.57E-23
Ac-227	3.59E-26
Th-227	2.48E-23
Fr-223	1.61E-25
Ra-223	2.76E-23
Rn-219	1.21E-23

At-219	0.00E+00
Bi-215	4.46E-29
Po-215	3.70E-26
Pb-211	1.55E-23
Bi-211	9.76E-24
Tl-207	2.89E-24
Po-211	4.71E-27
Pu-240	1.34E-10
U-236	2.11E-20
Th-232	1.75E-29
Ra-228	1.37E-29
Ac-228	2.75E-26
Th-228	5.49E-29
Ra-224	2.67E-28
Rn-220	1.67E-29
Po-216	4.05E-31
Pb-212	3.65E-27
Bi-212	3.02E-27
Po-212	0.00E+00
Tl-208	2.94E-26
Pu-241	1.84E-11
Am-241	1.64E-09
U-237	2.06E-15
Np-237	2.61E-16
Pa-233	2.36E-15
U-233	2.81E-22
Th-229	6.56E-23
Ra-225	7.93E-24
Ac-225	1.10E-23
Fr-221	2.32E-23
At-217	1.97E-25
Bi-213	1.13E-22
Po-213	3.03E-26
Tl-209	3.58E-23
Pb-209	6.66E-25
Pu-242	1.03E-15
U-238	7.21E-28
Th-234	2.36E-26
Pa-234m	1.09E-25
Pa-234	6.67E-27
Cm-243	4.91E-14
Am-243	8.33E-21
Np-239	2.79E-20
Cm-244	2.21E-10
Sb-125	1.53E-15
TOTAL	2.62E-07

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	D-13 of D-14		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

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INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radionuclides and Pathways)

	Distance (m)	
Direction	10459	13369
N	1.1E+00	8.0E-01
NNW	1.1E+00	8.4E-01
NW	1.8E+00	1.3E+00
WNW	1.2E+00	8.9E-01
W	4.6E-01	3.4E-01
WSW	3.4E-01	2.5E-01
SW	3.8E-01	2.8E-01
SSW	5.3E-01	4.0E-01
S	1.3E+00	9.5E-01
SSE	1.5E+00	1.1E+00
SE	1.1E+00	8.6E-01
ESE	7.2E-01	5.4E-01
E	6.1E-01	4.6E-01
ENE	6.6E-01	4.9E-01
NE	9.4E-01	7.1E-01
NNE	1.0E+00	7.8E-01

- Double underlined number is MEI value at the LIGO boundary
- Wavy underlined number is MEI value at the Energy Northwest boundary
- Shaded number is the overall maximum value to the "onsite" MEI (LIGO or Energy Northwest)

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	D-14 of D-14		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Thu Jun 12 11:46:09 2025 SUMMARY
Page 6

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)	
Direction	10459	13369
N	2.1E-07	1.6E-07
NNW	2.2E-07	1.6E-07
NW	3.5E-07	2.6E-07
WNW	2.3E-07	1.7E-07
W	8.9E-08	6.5E-08
WSW	6.6E-08	4.8E-08
SW	7.3E-08	5.4E-08
SSW	1.0E-07	7.7E-08
S	2.4E-07	1.8E-07
SSE	2.9E-07	2.2E-07
SE	2.2E-07	1.7E-07
ESE	1.4E-07	1.0E-07
E	1.2E-07	8.9E-08
ENE	1.3E-07	9.6E-08
NE	1.8E-07	1.4E-07
NNE	2.0E-07	1.5E-07

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	E-1 of E-16		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Attachment E

CAP88 Synopsis and Summary Report – Fugitive Source Emissions -Offsite MEIs

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	E-2 of E-16		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

C A P 8 8 - P C

Version 4.0

Clean Air Act Assessment Package - 1988

S Y N O P S I S R E P O R T

Non-Radon Individual Assessment
Thu Jun 12 17:07:46 2025

Facility: 324 Facility D&D
Address:
City: Richland
State: WA Zip:

Source Category:
Source Type: Area
Emission Year: 2025
DOSE Age Group: Adult

Comments: Fugitive Source Emissions
2025 TEDE Calculation - Offsite MEIs

Committed Effective Dose Equivalent
(mrem)

1.45E+00

At This Location: 1657 Meters South Southeast

Dataset Name: 324-Fug-Off.
Dataset Date: Jun 12, 2025 05:07 PM
Wind File: C:\Users\h0110065\OneDrive - HANFORD\Documents\CAP88\Wi

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	E-3 of E-16		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Thu Jun 12 17:07:46 2025 SYNOPSIS
Page 1

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 1657 Meters South Southeast
Lifetime Fatal Cancer Risk: 2.83E-07

ORGAN DOSE EQUIVALENT SUMMARY
(RN-222 Working Level Calculations Excluded)

Organ	Dose Equivalent (mrem)
Adrenal	9.67E-01
UB_Wall	1.03E+00
Bone_Sur	7.87E+00
Brain	9.06E-01
Breasts	9.34E-01
St_Wall	9.71E-01
SI_Wall	9.88E-01
ULI_Wall	1.07E+00
LLI_Wall	1.38E+00
Kidneys	9.82E-01
Liver	1.10E+00
Muscle	9.99E-01
Ovaries	1.03E+00
Pancreas	9.72E-01
R_Marrow	3.36E+00
Skin	6.73E+00
Spleen	9.75E-01
Testes	1.03E+00
Thymus	9.56E-01
Thyroid	1.00E+00
GB_Wall	9.64E-01
Ht_Wall	9.79E-01
Uterus	9.95E-01
ET_Reg	9.27E-01
Lung_66	1.01E+00
Effectiv	1.45E+00

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	E-4 of E-16		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

RADIONUCLIDE EMISSIONS DURING THE YEAR 2025

Nuclide	Type	Size	Source #1 Ci/y	TOTAL Ci/y
Co-60	M	1.000	8.5E-07	8.5E-07
Se-79	F	1.000	6.7E-10	6.7E-10
Sr-90	M	1.000	1.1E-01	1.1E-01
Y-90	M	1.000	1.1E-01	1.1E-01
Tc-99	M	1.000	3.2E-08	3.2E-08
Te-125m	M	1.000	1.6E-08	1.6E-08
Cs-134	F	1.000	9.9E-12	9.9E-12
Cs-137	F	1.000	2.1E-01	2.1E-01
Ba-137m	B	0.000	2.0E-01	2.0E-01
Eu-154	M	1.000	8.2E-05	8.2E-05
Eu-155	M	1.000	2.2E-06	2.2E-06
Pu-238	M	1.000	8.8E-05	8.8E-05
Pu-239	M	1.000	3.2E-05	3.2E-05
Pu-240	M	1.000	3.2E-05	3.2E-05
Pu-241	M	1.000	4.4E-04	4.4E-04
Pu-242	M	1.000	1.2E-09	1.2E-09
Am-241	M	1.000	4.9E-04	4.9E-04
Cm-243	M	1.000	1.3E-08	1.3E-08
Cm-244	M	1.000	7.7E-05	7.7E-05
Sb-125	M	1.000	6.9E-08	6.9E-08

SITE INFORMATION

Temperature: 12.400 degrees C
Precipitation: 18.160 cm/y
Humidity: 8.000 g/cu m
Mixing Height: 1000.0 m

User specified location of max exposed individual.
(ILOC, JLOC): SSE, 1657 meters

Thu Jun 12 17:07:46 2025 SYNOPSIS
Page 2

SOURCE INFORMATION

Source Number: 1

Source Height (m): 0.00
Area (sq m): 4423.00

Plume Rise Pasquill Cat:	A	B	C	D	E	F	G
Fixed (m):	None	None	None	None	None	None	None

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	1.0000	1.0000	1.0000
Fraction From Assessment Area:	0.0000	0.0000	0.0000
Fraction Imported:	0.0000	0.0000	0.0000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES (M) USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

976	1137	1144	1154	1307	1340	1507
1650	1657	1827	1866	1938	2011	2249
2286	18469					

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	E-6 of E-16		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

D O S E A N D R I S K S U M M A R I E S

Non-Radon Individual Assessment
Thu Jun 12 17:07:46 2025

Facility: 324 Facility D&D
Address:
City: Richland
State: WA Zip:

Source Category:
Source Type: Area
Emission Year: 2025
DOSE Age Group: Adult

Comments: Fugitive Source Emissions
2025 TEDE Calculation - Offsite MEIs

Dataset Name: 324-Fug-Off.
Dataset Date: Jun 12, 2025 05:07 PM
Wind File: C:\Users\h0110065\OneDrive - HANFORD\Documents\CAP88\Wind Files\a2330010.wnd

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	E-7 of E-16		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Thu Jun 12 17:07:46 2025 SUMMARY
Page 1

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)
Adrenal	9.67E-01
UB_Wall	1.03E+00
Bone_Sur	7.87E+00
Brain	9.06E-01
Breasts	9.34E-01
St_Wall	9.71E-01
SI_Wall	9.88E-01
ULI_Wall	1.07E+00
LLI_Wall	1.38E+00
Kidneys	9.82E-01
Liver	1.10E+00
Muscle	9.99E-01
Ovaries	1.03E+00
Pancreas	9.72E-01
R_Marrow	3.36E+00
Skin	6.73E+00
Spleen	9.75E-01
Testes	1.03E+00
Thymus	9.56E-01
Thyroid	1.00E+00
GB_Wall	9.64E-01
Ht_Wall	9.79E-01
Uterus	9.95E-01
ET_Reg	9.27E-01
Lung_66	1.01E+00
Effectiv	1.45E+00

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)
INGESTION	8.83E-01
INHALATION	3.91E-02
AIR IMMERSION	3.78E-05
GROUND SURFACE	5.29E-01
INTERNAL	9.22E-01
EXTERNAL	5.29E-01
TOTAL	1.45E+00

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	E-8 of E-16		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

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Page 2

NUCLIDE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem)
Co-60	2.85E-06
Se-79	5.42E-10
Sr-90	3.64E-01
Y-90	4.86E-02
Tc-99	1.79E-08
Te-125m	4.91E-10
Cs-134	2.38E-11
Cs-137	5.27E-01
Ba-137m	4.77E-01
Eu-154	1.99E-04
Eu-155	1.71E-07
Pu-238	4.67E-03
U-234	1.73E-11
Th-230	2.73E-15
Ra-226	1.48E-16
Rn-222	8.21E-18
Po-218	1.47E-22
Pb-214	5.36E-15
At-218	5.52E-22
Bi-214	3.13E-14
Rn-218	3.19E-24
Po-214	1.74E-18
Tl-210	1.22E-17
Pb-210	1.15E-17
Bi-210	1.86E-16
Hg-206	1.51E-23
Po-210	4.64E-20
Tl-206	4.35E-22
Pu-239	1.88E-03
U-235m	0.00E+00
U-235	6.40E-13
Th-231	6.52E-14
Pa-231	4.79E-17
Ac-227	9.33E-20
Th-227	4.44E-17
Fr-223	4.20E-19
Ra-223	4.95E-17
Rn-219	2.14E-17
At-219	0.00E+00
Bi-215	9.70E-23

Po-215	6.55E-20
Pb-211	4.21E-17
Bi-211	1.73E-17
Tl-207	2.18E-17
Po-211	8.35E-21
Pu-240	1.87E-03
U-236	6.22E-14
Th-232	4.37E-23
Ra-228	4.41E-23
Ac-228	5.04E-20
Th-228	1.07E-22
Ra-224	4.75E-22
Rn-220	2.97E-23
Po-216	7.18E-25
Pb-212	6.53E-21
Bi-212	7.62E-21
Po-212	0.00E+00
Tl-208	5.26E-20
Pu-241	4.64E-04
Am-241	2.35E-02
U-237	3.81E-09
Np-237	5.15E-10
Pa-233	4.24E-09
U-233	6.62E-16
Th-229	1.20E-16
Ra-225	1.70E-17
Ac-225	2.03E-17
Fr-221	4.14E-17
At-217	3.49E-19
Bi-213	2.52E-16
Po-213	5.38E-20
Tl-209	6.50E-17
Pb-209	4.91E-18
Pu-242	6.60E-08
U-238	9.81E-21
Th-234	2.04E-19
Pa-234m	2.79E-18
Pa-234	5.51E-20
Cm-243	4.67E-07
Am-243	1.40E-14
Np-239	4.57E-14
Cm-244	2.29E-03
Sb-125	2.23E-08
TOTAL	1.45E+00

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	E-10 of E-16		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

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CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	1.48E-08
INHALATION	4.30E-09
AIR IMMERSION	2.03E-11
GROUND SURFACE	2.64E-07
INTERNAL	1.91E-08
EXTERNAL	2.64E-07
TOTAL	2.83E-07

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	E-11 of E-16		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

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NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
Co-60	1.45E-12
Se-79	6.90E-18
Sr-90	8.03E-09
Y-90	5.83E-09
Tc-99	3.18E-16
Te-125m	3.87E-16
Cs-134	5.46E-18
Cs-137	8.79E-09
Ba-137m	2.58E-07
Eu-154	1.08E-10
Eu-155	9.74E-14
Pu-238	3.99E-10
U-234	5.95E-18
Th-230	1.16E-21
Ra-226	8.02E-23
Rn-222	4.48E-24
Po-218	6.55E-29
Pb-214	2.87E-21
At-218	6.80E-29
Bi-214	1.65E-20
Rn-218	1.75E-30
Po-214	9.53E-25
Tl-210	6.53E-24
Pb-210	5.17E-24
Bi-210	2.06E-23
Hg-206	6.68E-30
Po-210	2.55E-26
Tl-206	4.89E-29
Pu-239	1.39E-10
U-235m	0.00E+00
U-235	3.46E-19
Th-231	2.98E-20
Pa-231	2.50E-23
Ac-227	3.49E-26
Th-227	2.40E-23
Fr-223	1.56E-25
Ra-223	2.67E-23
Rn-219	1.17E-23

At-219	0.00E+00
Bi-215	4.33E-29
Po-215	3.59E-26
Pb-211	1.50E-23
Bi-211	9.47E-24
Tl-207	2.80E-24
Po-211	4.57E-27
Pu-240	1.46E-10
U-236	2.04E-20
Th-232	1.71E-29
Ra-228	1.34E-29
Ac-228	2.68E-26
Th-228	5.35E-29
Ra-224	2.60E-28
Rn-220	1.63E-29
Po-216	3.94E-31
Pb-212	3.55E-27
Bi-212	2.94E-27
Po-212	0.00E+00
Tl-208	2.86E-26
Pu-241	2.02E-11
Am-241	1.78E-09
U-237	2.02E-15
Np-237	2.53E-16
Pa-233	2.29E-15
U-233	2.73E-22
Th-229	6.36E-23
Ra-225	7.69E-24
Ac-225	1.07E-23
Fr-221	2.25E-23
At-217	1.91E-25
Bi-213	1.09E-22
Po-213	2.94E-26
Tl-209	3.47E-23
Pb-209	6.46E-25
Pu-242	5.15E-15
U-238	3.21E-27
Th-234	1.06E-25
Pa-234m	4.89E-25
Pa-234	2.99E-26
Cm-243	4.76E-14
Am-243	7.30E-21
Np-239	2.45E-20
Cm-244	2.46E-10
Sb-125	1.18E-14
TOTAL	2.83E-07

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	E-13 of E-16		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

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INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	976	1137	1144	1154	1307	1340	1507
N	2.4E+00	1.9E+00	1.9E+00	1.8E+00	1.5E+00	1.4E+00	1.2E+00
NNW	2.9E+00	2.2E+00	2.2E+00	2.1E+00	1.7E+00	1.7E+00	1.3E+00
NW	4.8E+00	3.7E+00	3.6E+00	3.6E+00	2.9E+00	2.8E+00	2.3E+00
WNW	2.9E+00	2.3E+00	2.2E+00	2.2E+00	1.8E+00	1.7E+00	1.4E+00
W	9.9E-01	7.6E-01	7.5E-01	7.4E-01	6.0E-01	5.7E-01	4.6E-01
WSW	7.1E-01	5.4E-01	5.4E-01	5.3E-01	4.3E-01	4.1E-01	3.3E-01
SW	8.4E-01	6.4E-01	6.4E-01	6.3E-01	5.1E-01	4.8E-01	3.9E-01
SSW	1.2E+00	9.5E-01	9.4E-01	9.2E-01	7.5E-01	7.1E-01	5.8E-01
S	3.2E+00	2.5E+00	2.4E+00	2.4E+00	2.0E+00	1.9E+00	1.5E+00
SSE	3.6E+00	2.8E+00	2.7E+00	2.7E+00	2.2E+00	2.1E+00	1.7E+00
SE	2.8E+00	2.1E+00	2.1E+00	2.1E+00	1.7E+00	1.6E+00	1.3E+00
ESE	1.7E+00	1.3E+00	1.3E+00	1.3E+00	1.0E+00	9.7E-01	7.9E-01
E	1.3E+00	1.0E+00	1.0E+00	1.0E+00	8.1E-01	7.7E-01	6.3E-01
ENE	1.4E+00	1.1E+00	1.0E+00	1.0E+00	8.3E-01	7.9E-01	6.5E-01
NE	1.9E+00	1.5E+00	1.5E+00	1.5E+00	1.2E+00	1.1E+00	9.3E-01
NNE	2.2E+00	1.7E+00	1.7E+00	1.7E+00	1.4E+00	1.3E+00	1.1E+00

	Distance (m)						
Direction	1650	1657	1827	1866	1938	2011	2249
N	9.9E-01	9.8E-01	8.3E-01	8.0E-01	7.5E-01	7.1E-01	5.9E-01
NNW	1.2E+00	1.1E+00	9.7E-01	9.3E-01	8.7E-01	8.2E-01	6.8E-01
NW	1.9E+00	1.9E+00	1.6E+00	1.6E+00	1.5E+00	1.4E+00	1.1E+00
WNW	1.2E+00	1.2E+00	1.0E+00	9.6E-01	9.0E-01	8.5E-01	7.0E-01
W	4.0E-01	3.9E-01	3.3E-01	3.2E-01	3.0E-01	2.8E-01	2.3E-01
WSW	2.8E-01	2.8E-01	2.4E-01	2.3E-01	2.1E-01	2.0E-01	1.7E-01
SW	3.4E-01	3.3E-01	2.8E-01	2.7E-01	2.5E-01	2.4E-01	2.0E-01
SSW	5.0E-01	4.9E-01	4.2E-01	4.0E-01	3.8E-01	3.5E-01	2.9E-01
S	1.3E+00	1.3E+00	1.1E+00	1.1E+00	1.0E+00	9.4E-01	7.8E-01
SSE	1.5E+00	1.5E+00	1.2E+00	1.2E+00	1.1E+00	1.0E+00	8.6E-01
SE	1.1E+00	1.1E+00	9.3E-01	8.9E-01	8.4E-01	7.8E-01	6.5E-01
ESE	6.7E-01	6.7E-01	5.6E-01	5.4E-01	5.1E-01	4.8E-01	3.9E-01
E	5.4E-01	5.3E-01	4.5E-01	4.3E-01	4.1E-01	3.8E-01	3.1E-01
ENE	5.6E-01	5.5E-01	4.7E-01	4.5E-01	4.2E-01	4.0E-01	3.3E-01
NE	8.0E-01	8.0E-01	6.8E-01	6.5E-01	6.1E-01	5.8E-01	4.8E-01
NNE	9.2E-01	9.1E-01	7.7E-01	7.5E-01	7.0E-01	6.6E-01	5.5E-01

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	E-14 of E-16		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

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INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radionuclides and Pathways)

	Distance (m)	
Direction	2286	18469
N	5.7E-01	2.6E-02
NNW	6.6E-01	2.9E-02
NW	1.1E+00	5.1E-02
WNW	6.8E-01	3.1E-02
W	2.3E-01	9.2E-03
WSW	1.6E-01	6.6E-03
SW	1.9E-01	7.8E-03
SSW	2.8E-01	1.2E-02
S	7.6E-01	3.6E-02
SSE	8.4E-01	3.9E-02
SE	6.3E-01	2.7E-02
ESE	3.8E-01	1.6E-02
E	3.1E-01	1.3E-02
ENE	3.2E-01	1.5E-02
NE	4.7E-01	2.3E-02
NNE	5.3E-01	2.6E-02

- Underlined number is the TEDE value to the MEI at the Hanford Site Boundary
- Shaded number is the overall maximum value to the MEI at the Hanford Site Boundary.

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	E-15 of E-16		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

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INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	976	1137	1144	1154	1307	1340	1507
N	4.8E-07	3.7E-07	3.6E-07	3.6E-07	2.9E-07	2.8E-07	2.3E-07
NNW	5.6E-07	4.3E-07	4.2E-07	4.2E-07	3.4E-07	3.2E-07	2.6E-07
NW	9.3E-07	7.1E-07	7.1E-07	7.0E-07	5.6E-07	5.4E-07	4.4E-07
WNW	5.7E-07	4.4E-07	4.4E-07	4.3E-07	3.5E-07	3.3E-07	2.7E-07
W	1.9E-07	1.5E-07	1.5E-07	1.4E-07	1.2E-07	1.1E-07	9.1E-08
WSW	1.4E-07	1.1E-07	1.1E-07	1.0E-07	8.3E-08	8.0E-08	6.5E-08
SW	1.6E-07	1.3E-07	1.2E-07	1.2E-07	9.9E-08	9.5E-08	7.7E-08
SSW	2.4E-07	1.8E-07	1.8E-07	1.8E-07	1.5E-07	1.4E-07	1.1E-07
S	6.3E-07	4.8E-07	4.8E-07	4.7E-07	3.8E-07	3.7E-07	3.0E-07
SSE	7.0E-07	5.4E-07	5.3E-07	5.3E-07	4.3E-07	4.1E-07	3.3E-07
SE	5.4E-07	4.1E-07	4.1E-07	4.0E-07	3.3E-07	3.1E-07	2.5E-07
ESE	3.3E-07	2.5E-07	2.5E-07	2.5E-07	2.0E-07	1.9E-07	1.5E-07
E	2.6E-07	2.0E-07	2.0E-07	2.0E-07	1.6E-07	1.5E-07	1.2E-07
ENE	2.7E-07	2.1E-07	2.0E-07	2.0E-07	1.6E-07	1.6E-07	1.3E-07
NE	3.8E-07	2.9E-07	2.9E-07	2.9E-07	2.3E-07	2.2E-07	1.8E-07
NNE	4.4E-07	3.4E-07	3.3E-07	3.3E-07	2.7E-07	2.5E-07	2.1E-07

	Distance (m)						
Direction	1650	1657	1827	1866	1938	2011	2249
N	1.9E-07	1.9E-07	1.6E-07	1.6E-07	1.5E-07	1.4E-07	1.1E-07
NNW	2.2E-07	2.2E-07	1.9E-07	1.8E-07	1.7E-07	1.6E-07	1.3E-07
NW	3.8E-07	3.7E-07	3.2E-07	3.1E-07	2.9E-07	2.7E-07	2.2E-07
WNW	2.3E-07	2.3E-07	2.0E-07	1.9E-07	1.8E-07	1.7E-07	1.4E-07
W	7.8E-08	7.7E-08	6.5E-08	6.3E-08	5.9E-08	5.5E-08	4.5E-08
WSW	5.5E-08	5.5E-08	4.6E-08	4.5E-08	4.2E-08	3.9E-08	3.2E-08
SW	6.6E-08	6.5E-08	5.5E-08	5.3E-08	4.9E-08	4.6E-08	3.8E-08
SSW	9.7E-08	9.7E-08	8.2E-08	7.9E-08	7.4E-08	6.9E-08	5.7E-08
S	2.6E-07	2.5E-07	2.2E-07	2.1E-07	1.9E-07	1.8E-07	1.5E-07
SSE	2.9E-07	2.8E-07	2.4E-07	2.3E-07	2.2E-07	2.0E-07	1.7E-07
SE	2.2E-07	2.1E-07	1.8E-07	1.7E-07	1.6E-07	1.5E-07	1.3E-07
ESE	1.3E-07	1.3E-07	1.1E-07	1.1E-07	9.9E-08	9.3E-08	7.7E-08
E	1.0E-07	1.0E-07	8.8E-08	8.5E-08	7.9E-08	7.4E-08	6.1E-08
ENE	1.1E-07	1.1E-07	9.1E-08	8.8E-08	8.2E-08	7.7E-08	6.4E-08
NE	1.6E-07	1.6E-07	1.3E-07	1.3E-07	1.2E-07	1.1E-07	9.3E-08
NNE	1.8E-07	1.8E-07	1.5E-07	1.5E-07	1.4E-07	1.3E-07	1.1E-07

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
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Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Thu Jun 12 17:07:46 2025 SUMMARY
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INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)	
Direction	2286	18469
N	1.1E-07	5.1E-09
NNW	1.3E-07	5.6E-09
NW	2.2E-07	1.0E-08
WNW	1.3E-07	6.1E-09
W	4.4E-08	1.8E-09
WSW	3.2E-08	1.3E-09
SW	3.7E-08	1.5E-09
SSW	5.6E-08	2.4E-09
S	1.5E-07	7.0E-09
SSE	1.6E-07	7.5E-09
SE	1.2E-07	5.2E-09
ESE	7.5E-08	3.1E-09
E	6.0E-08	2.5E-09
ENE	6.2E-08	2.9E-09
NE	9.1E-08	4.5E-09
NNE	1.0E-07	5.1E-09

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	F-1 of F-14		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Attachment F

CAP88 Synopsis and Summary Report – Fugitive Source Emissions -Onsite MEIs

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	F-2 of F-14		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

C A P 8 8 - P C

Version 4.0

Clean Air Act Assessment Package - 1988

S Y N O P S I S R E P O R T

Non-Radon Individual Assessment
Thu Jun 12 12:08:25 2025

Facility: 324 Facility D&D
Address:
City: Richland
State: WA Zip:

Source Category:
Source Type: Area
Emission Year: 2025
DOSE Age Group: Adult

Comments: Fugitive Source Emissions
2025 TEDE Calculation - Onsite MEIs

Committed Effective Dose Equivalent
(mrem)

7.71E-02

At This Location: 13369 Meters Northwest

Dataset Name: 324-Fug-On.
Dataset Date: Jun 12, 2025 12:08 PM
Wind File: C:\Users\h0110065\OneDrive - HANFORD\Documents\CAP88\Wi

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	F-3 of F-14		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

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Page 1

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 13369 Meters Northwest
Lifetime Fatal Cancer Risk: 1.51E-08

ORGAN DOSE EQUIVALENT SUMMARY
(RN-222 Working Level Calculations Excluded)

Organ	Dose Equivalent (mrem)
Adrenal	5.14E-02
UB_Wall	5.45E-02
Bone_Sur	4.15E-01
Brain	4.81E-02
Breasts	4.96E-02
St_Wall	5.16E-02
SI_Wall	5.25E-02
ULI_Wall	5.70E-02
LLI_Wall	7.33E-02
Kidneys	5.22E-02
Liver	5.82E-02
Muscle	5.31E-02
Ovaries	5.48E-02
Pancreas	5.16E-02
R_Marrow	1.78E-01
Skin	3.58E-01
Spleen	5.18E-02
Testes	5.48E-02
Thymus	5.08E-02
Thyroid	5.33E-02
GB_Wall	5.12E-02
Ht_Wall	5.20E-02
Uterus	5.29E-02
ET_Reg	4.93E-02
Lung_66	5.37E-02
Effectiv	7.71E-02

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	F-4 of F-14		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

RADIONUCLIDE EMISSIONS DURING THE YEAR 2025

Nuclide	Type	Size	Source #1 Ci/y	TOTAL Ci/y
Co-60	M	1.000	8.5E-07	8.5E-07
Se-79	F	1.000	6.7E-10	6.7E-10
Sr-90	M	1.000	1.1E-01	1.1E-01
Y-90	M	1.000	1.1E-01	1.1E-01
Tc-99	M	1.000	3.2E-08	3.2E-08
Te-125m	M	1.000	1.6E-08	1.6E-08
Cs-134	F	1.000	9.9E-12	9.9E-12
Cs-137	F	1.000	2.1E-01	2.1E-01
Ba-137m	B	0.000	2.0E-01	2.0E-01
Eu-154	M	1.000	8.2E-05	8.2E-05
Eu-155	M	1.000	2.2E-06	2.2E-06
Pu-238	M	1.000	8.8E-05	8.8E-05
Pu-239	M	1.000	3.2E-05	3.2E-05
Pu-240	M	1.000	3.2E-05	3.2E-05
Pu-241	M	1.000	4.4E-04	4.4E-04
Pu-242	M	1.000	1.2E-09	1.2E-09
Am-241	M	1.000	4.9E-04	4.9E-04
Cm-243	M	1.000	1.3E-08	1.3E-08
Cm-244	M	1.000	7.7E-05	7.7E-05
Sb-125	M	1.000	6.9E-08	6.9E-08

SITE INFORMATION

Temperature: 12.400 degrees C
Precipitation: 18.160 cm/y
Humidity: 8.000 g/cu m
Mixing Height: 1000.0 m

User specified location of max exposed individual.
(ILOC, JLOC): NW ,13369 meters

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	F-5 of F-14		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

SOURCE INFORMATION

Source Number: 1

Source Height (m): 0.00
Area (sq m): 4423.00

Plume Rise Pasquill Cat:	A	B	C	D	E	F	G
Fixed (m):	None	None	None	None	None	None	None

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	1.0000	1.0000	1.0000
Fraction From Assessment Area:	0.0000	0.0000	0.0000
Fraction Imported:	0.0000	0.0000	0.0000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES (M) USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

10459 13369

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	F-6 of F-14		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

D O S E A N D R I S K S U M M A R I E S

Non-Radon Individual Assessment
Thu Jun 12 12:08:25 2025

Facility: 324 Facility D&D
Address:
City: Richland
State: WA Zip:

Source Category:
Source Type: Area
Emission Year: 2025
DOSE Age Group: Adult

Comments: Fugitive Source Emissions
2025 TEDE Calculation - Onsite MEIs

Dataset Name: 324-Fug-On.
Dataset Date: Jun 12, 2025 12:08 PM
Wind File: C:\Users\h0110065\OneDrive - HANFORD\Documents\CAP88\Wind Files\a2330010.wnd

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	F-7 of F-14		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

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Page 1

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)
Adrenal	5.14E-02
UB_Wall	5.45E-02
Bone_Sur	4.15E-01
Brain	4.81E-02
Breasts	4.96E-02
St_Wall	5.16E-02
SI_Wall	5.25E-02
ULI_Wall	5.70E-02
LLI_Wall	7.33E-02
Kidneys	5.22E-02
Liver	5.82E-02
Muscle	5.31E-02
Ovaries	5.48E-02
Pancreas	5.16E-02
R_Marrow	1.78E-01
Skin	3.58E-01
Spleen	5.18E-02
Testes	5.48E-02
Thymus	5.08E-02
Thyroid	5.33E-02
GB_Wall	5.12E-02
Ht_Wall	5.20E-02
Uterus	5.29E-02
ET_Reg	4.93E-02
Lung_66	5.37E-02
Effectiv	7.71E-02

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)
INGESTION	4.69E-02
INHALATION	1.98E-03
AIR IMMERSION	1.91E-06
GROUND SURFACE	2.81E-02
INTERNAL	4.89E-02
EXTERNAL	2.81E-02
TOTAL	7.71E-02

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	F-8 of F-14		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Thu Jun 12 12:08:25 2025 SUMMARY
Page 2

NUCLIDE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem)
Co-60	1.51E-07
Se-79	2.88E-11
Sr-90	1.93E-02
Y-90	2.58E-03
Tc-99	9.52E-10
Te-125m	2.60E-11
Cs-134	1.26E-12
Cs-137	2.80E-02
Ba-137m	2.54E-02
Eu-154	1.06E-05
Eu-155	9.07E-09
Pu-238	2.37E-04
U-234	9.25E-13
Th-230	1.45E-16
Ra-226	7.84E-18
Rn-222	4.36E-19
Po-218	7.80E-24
Pb-214	2.85E-16
At-218	2.93E-23
Bi-214	1.66E-15
Rn-218	1.70E-25
Po-214	9.22E-20
Tl-210	6.50E-19
Pb-210	6.13E-19
Bi-210	9.90E-18
Hg-206	7.92E-25
Po-210	2.47E-21
Tl-206	2.31E-23
Pu-239	9.53E-05
U-235m	0.00E+00
U-235	3.40E-14
Th-231	3.47E-15
Pa-231	2.54E-18
Ac-227	4.96E-21
Th-227	2.36E-18
Fr-223	2.23E-20
Ra-223	2.63E-18
Rn-219	1.14E-18

At-219	0.00E+00
Bi-215	5.16E-24
Po-215	3.48E-21
Pb-211	2.24E-18
Bi-211	9.22E-19
Tl-207	1.16E-18
Po-211	4.44E-22
Pu-240	9.50E-05
U-236	3.33E-15
Th-232	2.32E-24
Ra-228	2.34E-24
Ac-228	2.68E-21
Th-228	5.69E-24
Ra-224	2.53E-23
Rn-220	1.58E-24
Po-216	3.82E-26
Pb-212	3.47E-22
Bi-212	4.05E-22
Po-212	0.00E+00
Tl-208	2.80E-21
Pu-241	2.36E-05
Am-241	1.19E-03
U-237	2.02E-10
Np-237	2.74E-11
Pa-233	2.25E-10
U-233	3.52E-17
Th-229	6.39E-18
Ra-225	9.03E-19
Ac-225	1.08E-18
Fr-221	2.20E-18
At-217	1.86E-20
Bi-213	1.34E-17
Po-213	2.86E-21
Tl-209	3.45E-18
Pb-209	2.61E-19
Pu-242	3.35E-09
U-238	5.27E-22
Th-234	1.09E-20
Pa-234m	1.49E-19
Pa-234	2.93E-21
Cm-243	2.37E-08
Am-243	7.45E-16
Np-239	2.43E-15
Cm-244	1.16E-04
Sb-125	1.18E-09
TOTAL	7.71E-02

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	F-10 of F-14		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

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CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	7.86E-10
INHALATION	2.18E-10
AIR IMMERSION	1.03E-12
GROUND SURFACE	1.41E-08
INTERNAL	1.00E-09
EXTERNAL	1.41E-08
TOTAL	1.51E-08

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	F-11 of F-14		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

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NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
Co-60	7.73E-14
Se-79	3.67E-19
Sr-90	4.23E-10
Y-90	3.10E-10
Tc-99	1.68E-17
Te-125m	2.05E-17
Cs-134	2.89E-19
Cs-137	4.67E-10
Ba-137m	1.37E-08
Eu-154	5.76E-12
Eu-155	5.17E-15
Pu-238	2.03E-11
U-234	3.19E-19
Th-230	6.16E-23
Ra-226	4.26E-24
Rn-222	2.38E-25
Po-218	3.48E-30
Pb-214	1.52E-22
At-218	3.61E-30
Bi-214	8.79E-22
Rn-218	9.28E-32
Po-214	5.06E-26
Tl-210	3.47E-25
Pb-210	2.75E-25
Bi-210	1.10E-24
Hg-206	3.51E-31
Po-210	1.35E-27
Tl-206	2.60E-30
Pu-239	7.06E-12
U-235m	0.00E+00
U-235	1.84E-20
Th-231	1.58E-21
Pa-231	1.33E-24
Ac-227	1.85E-27
Th-227	1.28E-24
Fr-223	8.31E-27
Ra-223	1.42E-24
Rn-219	6.24E-25

At-219	0.00E+00
Bi-215	2.30E-30
Po-215	1.91E-27
Pb-211	8.00E-25
Bi-211	5.03E-25
Tl-207	1.49E-25
Po-211	2.43E-28
Pu-240	7.41E-12
U-236	1.09E-21
Th-232	9.08E-31
Ra-228	7.12E-31
Ac-228	1.42E-27
Th-228	2.84E-30
Ra-224	1.38E-29
Rn-220	8.66E-31
Po-216	2.10E-32
Pb-212	1.89E-28
Bi-212	1.56E-28
Po-212	0.00E+00
Tl-208	1.52E-27
Pu-241	1.02E-12
Am-241	9.02E-11
U-237	1.07E-16
Np-237	1.35E-17
Pa-233	1.22E-16
U-233	1.45E-23
Th-229	3.38E-24
Ra-225	4.09E-25
Ac-225	5.68E-25
Fr-221	1.19E-24
At-217	1.01E-26
Bi-213	5.81E-24
Po-213	1.56E-27
Tl-209	1.85E-24
Pb-209	3.43E-26
Pu-242	2.62E-16
U-238	1.72E-28
Th-234	5.62E-27
Pa-234m	2.60E-26
Pa-234	1.59E-27
Cm-243	2.43E-15
Am-243	3.88E-22
Np-239	1.30E-21
Cm-244	1.25E-11
Sb-125	6.25E-16
TOTAL	1.51E-08

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	F-13 of F-14		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

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INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radionuclides and Pathways)

	Distance (m)	
Direction	10459	13369
N	5.3E-02	3.9E-02
NNW	5.9E-02	4.4E-02
NW	1.0E-01	7.7E-02
WNW	6.4E-02	4.8E-02
W	2.0E-02	1.4E-02
WSW	1.4E-02	1.0E-02
SW	1.7E-02	1.2E-02
SSW	2.6E-02	1.9E-02
S	7.2E-02	5.4E-02
SSE	7.9E-02	5.8E-02
SE	5.6E-02	4.1E-02
ESE	3.3E-02	2.4E-02
E	2.7E-02	2.0E-02
ENE	3.0E-02	2.2E-02
NE	4.7E-02	3.5E-02
NNE	5.3E-02	3.9E-02

- Double underlined number is MEI value at the LIGO boundary
- Wavy underlined number is MEI value at the Energy Northwest boundary
- Shaded number is the overall maximum value to the "onsite" MEI (LIGO or Energy Northwest)

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Karen Price	**Date**	6/16/25	**Sheet No**	F-14 of F-14		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

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INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)	
Direction	10459	13369
N	1.0E-08	7.7E-09
NNW	1.2E-08	8.6E-09
NW	2.0E-08	1.5E-08
WNW	1.3E-08	9.3E-09
W	3.9E-09	2.8E-09
WSW	2.8E-09	2.0E-09
SW	3.3E-09	2.4E-09
SSW	5.1E-09	3.7E-09
S	1.4E-08	1.0E-08
SSE	1.5E-08	1.1E-08
SE	1.1E-08	8.0E-09
ESE	6.5E-09	4.7E-09
E	5.3E-09	3.9E-09
ENE	5.9E-09	4.4E-09
NE	9.2E-09	6.8E-09
NNE	1.0E-08	7.6E-09

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-1 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Attachment G

A Cell RadCalc Summary Reports

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-2 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\A Cell Residual 1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Co-60	1.730E-04	1.529E-07	6.401E-06
Se-79	1.030E-06	2.501E-04	3.811E-08
Sr-90	1.440E+00	1.043E-02	5.328E-02
Cs-137	2.720E+00	3.129E-02	1.006E-01
Eu-154	3.590E-03	1.328E-05	1.328E-04
Eu-155	1.770E-03	3.646E-06	6.549E-05
Pu-238	9.350E-04	5.460E-05	3.460E-05
Pu-239	3.020E-04	4.869E-03	1.117E-05
Pu-240	2.970E-04	1.309E-03	1.099E-05
Pu-241	1.030E-02	9.952E-05	3.811E-04
Pu-242	4.940E-07	1.249E-04	1.828E-08
Am-241	4.460E-03	1.302E-03	1.650E-04
Cm-243	2.320E-05	4.732E-07	8.584E-07
Cm-244	1.450E-03	1.782E-05	5.365E-05
Total Activity:	4.183E+00		1.548E-01

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	2.110E-05	1.865E-08	7.807E-07
Se-79	1.030E-06	2.501E-04	3.811E-08
Sr-90	9.796E-01	7.093E-03	3.625E-02
Y-90	9.799E-01	1.802E-06	3.626E-02
Cs-137	1.880E+00	2.163E-02	6.957E-02
Ba-137m	1.775E+00	3.298E-09	6.568E-02

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-3 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Eu-154	9.876E-04	3.654E-06	3.654E-05
Eu-155	1.716E-04	3.535E-07	6.351E-06
Pa-233	2.320E-08	1.118E-12	8.583E-10
U-234	3.964E-08	6.377E-06	1.467E-09
U-235m	3.017E-04	9.805E-12	1.116E-05
U-237	1.170E-07	1.434E-12	4.329E-09
Np-237	2.335E-08	3.314E-05	8.641E-10
Pu-238	8.239E-04	4.811E-05	3.049E-05
Pu-239	3.019E-04	4.867E-03	1.117E-05
Pu-240	2.983E-04	1.315E-03	1.104E-05
Pu-241	4.750E-03	4.590E-05	1.758E-04
Pu-242	4.940E-07	1.249E-04	1.828E-08
Am-241	4.528E-03	1.322E-03	1.675E-04
Cm-243	1.603E-05	3.270E-07	5.931E-07
Cm-244	7.831E-04	9.623E-06	2.897E-05
Total Activity:	5.628E+00		2.082E-01

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.004801	W
Heat Generated When Sealed:	0.0157	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-4 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\GC166-172-173-1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Co-60	1.220E-03	1.078E-06	4.514E-05
Se-79	1.150E-05	2.793E-03	4.255E-07
Sr-90	1.480E+01	1.072E-01	5.476E-01
Tc-99	3.810E-04	2.256E-02	1.410E-05
Cs-137	2.790E+01	3.210E-01	1.032E+00
Eu-154	3.040E-02	1.125E-04	1.125E-03
Eu-155	1.210E-02	2.492E-05	4.477E-04
Pu-238	1.010E-02	5.898E-04	3.737E-04
Pu-239	3.360E-03	5.418E-02	1.243E-04
Pu-240	3.310E-03	1.459E-02	1.225E-04
Pu-241	9.700E-02	9.373E-04	3.589E-03
Pu-242	5.500E-06	1.391E-03	2.035E-07
Am-241	5.000E-02	1.459E-02	1.850E-03
Cm-243	2.380E-04	4.854E-06	8.806E-06
Cm-244	1.410E-02	1.733E-04	5.217E-04
Total Activity:	4.292E+01		1.588E+00

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	1.488E-04	1.315E-07	5.506E-06
Se-79	1.150E-05	2.793E-03	4.255E-07
Sr-90	1.007E+01	7.290E-02	3.725E-01
Y-90	1.007E+01	1.852E-05	3.726E-01
Tc-99	3.810E-04	2.256E-02	1.410E-05

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-5 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Cs-137	1.929E+01	2.219E-01	7.136E-01
Ba-137m	1.821E+01	3.383E-08	6.737E-01
Eu-154	8.363E-03	3.094E-05	3.094E-04
Eu-155	1.173E-03	2.417E-06	4.341E-05
Pa-233	2.591E-07	1.249E-11	9.587E-09
U-234	4.282E-07	6.888E-05	1.584E-08
U-235m	3.357E-03	1.091E-10	1.242E-04
U-237	1.102E-06	1.350E-11	4.077E-08
Np-237	2.608E-07	3.701E-04	9.651E-09
Pu-238	8.900E-03	5.197E-04	3.293E-04
Pu-239	3.359E-03	5.415E-02	1.243E-04
Pu-240	3.322E-03	1.464E-02	1.229E-04
Pu-241	4.474E-02	4.323E-04	1.655E-03
Pu-242	5.500E-06	1.391E-03	2.035E-07
Am-241	5.044E-02	1.472E-02	1.866E-03
Cm-243	1.644E-04	3.354E-06	6.085E-06
Cm-244	7.615E-03	9.357E-05	2.817E-04
Total Activity:	5.777E+01		2.137E+00

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.04936	W
Heat Generated When Sealed:	0.1613	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-6 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\GC167-1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Se-79	4.250E-05	1.032E-02	1.573E-06
Sr-90	3.710E+01	2.686E-01	1.373E+00
Tc-99	1.410E-03	8.348E-02	5.217E-05
Sb-125	2.910E-02	2.805E-05	1.077E-03
Cs-137	3.750E+01	4.314E-01	1.388E+00
Eu-154	9.710E-02	3.592E-04	3.593E-03
Pu-238	7.720E-03	4.508E-04	2.856E-04
Pu-239	2.520E-03	4.063E-02	9.324E-05
Pu-240	2.520E-03	1.111E-02	9.324E-05
Pu-241	8.940E-02	8.638E-04	3.308E-03
Pu-242	4.140E-06	1.047E-03	1.532E-07
Am-241	1.790E-01	5.224E-02	6.623E-03
Cm-243	8.190E-04	1.671E-05	3.030E-05
Cm-244	5.140E-02	6.316E-04	1.902E-03
Total Activity:	7.506E+01		2.777E+00

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Se-79	4.250E-05	1.032E-02	1.572E-06
Sr-90	2.524E+01	1.827E-01	9.339E-01
Y-90	2.525E+01	4.643E-05	9.341E-01
Tc-99	1.410E-03	8.347E-02	5.217E-05
Sb-125	5.223E-04	5.034E-07	1.932E-05
Te-125m	1.239E-04	6.804E-09	4.585E-06

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-7 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Cs-137	2.592E+01	2.982E-01	9.592E-01
Ba-137m	2.447E+01	4.547E-08	9.055E-01
Eu-154	2.671E-02	9.883E-05	9.883E-04
Pa-233	9.144E-07	4.406E-11	3.383E-08
U-234	3.273E-07	5.265E-05	1.211E-08
U-235m	2.518E-03	8.183E-11	9.315E-05
U-237	1.016E-06	1.245E-11	3.758E-08
Np-237	9.205E-07	1.306E-03	3.406E-08
Pu-238	6.803E-03	3.973E-04	2.517E-04
Pu-239	2.519E-03	4.062E-02	9.321E-05
Pu-240	2.581E-03	1.137E-02	9.548E-05
Pu-241	4.123E-02	3.984E-04	1.526E-03
Pu-242	4.140E-06	1.047E-03	1.532E-07
Am-241	1.760E-01	5.138E-02	6.514E-03
Cm-243	5.659E-04	1.154E-05	2.094E-05
Cm-244	2.776E-02	3.411E-04	1.027E-03
Total Activity:	1.012E+02		3.743E+00

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.08921	W
Heat Generated When Sealed:	0.2978	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-8 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\GC168-1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Se-79	3.250E-04	7.892E-02	1.203E-05
Sr-90	2.830E+02	2.049E+00	1.047E+01
Tc-99	1.080E-02	6.394E-01	3.996E-04
Sb-125	2.220E-01	2.140E-04	8.214E-03
Cs-137	2.870E+02	3.302E+00	1.062E+01
Eu-154	7.430E-01	2.749E-03	2.749E-02
Pu-238	5.890E-02	3.440E-03	2.179E-03
Pu-239	1.930E-02	3.112E-01	7.141E-04
Pu-240	1.920E-02	8.461E-02	7.104E-04
Pu-241	6.800E-01	6.571E-03	2.516E-02
Pu-242	3.160E-05	7.992E-03	1.169E-06
Am-241	1.370E+00	3.998E-01	5.069E-02
Cm-243	6.260E-03	1.277E-04	2.316E-04
Cm-244	3.930E-01	4.829E-03	1.454E-02
Total Activity:	5.735E+02		2.122E+01

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Se-79	3.250E-04	7.892E-02	1.202E-05
Sr-90	1.925E+02	1.394E+00	7.123E+00
Y-90	1.926E+02	3.541E-04	7.125E+00
Tc-99	1.080E-02	6.394E-01	3.996E-04
Sb-125	3.984E-03	3.840E-06	1.474E-04
Te-125m	9.454E-04	5.191E-08	3.498E-05

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-9 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Cs-137	1.984E+02	2.282E+00	7.341E+00
Ba-137m	1.873E+02	3.480E-07	6.930E+00
Eu-154	2.044E-01	7.562E-04	7.563E-03
Pa-233	6.998E-06	3.372E-10	2.589E-07
U-234	2.497E-06	4.017E-04	9.240E-08
U-235m	1.928E-02	6.267E-10	7.134E-04
U-237	7.725E-06	9.466E-11	2.858E-07
Np-237	7.045E-06	9.996E-03	2.607E-07
Np-239	1.889E-08	8.144E-14	6.989E-10
Pu-238	5.190E-02	3.031E-03	1.920E-03
Pu-239	1.929E-02	3.111E-01	7.139E-04
Pu-240	1.966E-02	8.665E-02	7.275E-04
Pu-241	3.136E-01	3.030E-03	1.160E-02
Pu-242	3.160E-05	7.991E-03	1.169E-06
Am-241	1.347E+00	3.932E-01	4.985E-02
Am-243	1.890E-08	9.463E-08	6.992E-10
Cm-243	4.325E-03	8.823E-05	1.600E-04
Cm-244	2.122E-01	2.608E-03	7.853E-03
Total Activity:	7.730E+02		2.860E+01

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.6818	W
Heat Generated When Sealed:	2.275	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-10 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\GC169-1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Se-79	1.600E-05	3.885E-03	5.920E-07
Sr-90	1.400E+01	1.014E-01	5.180E-01
Tc-99	5.310E-04	3.144E-02	1.965E-05
Sb-125	1.090E-02	1.051E-05	4.033E-04
Cs-137	1.410E+01	1.622E-01	5.217E-01
Eu-154	3.650E-02	1.350E-04	1.351E-03
Pu-238	2.910E-03	1.699E-04	1.077E-04
Pu-239	9.490E-04	1.530E-02	3.511E-05
Pu-240	9.460E-04	4.169E-03	3.500E-05
Pu-241	3.350E-02	3.237E-04	1.240E-03
Pu-242	1.560E-06	3.945E-04	5.772E-08
Am-241	6.750E-02	1.970E-02	2.498E-03
Cm-243	3.080E-04	6.282E-06	1.140E-05
Cm-244	1.930E-02	2.372E-04	7.141E-04
Total Activity:	2.827E+01		1.046E+00

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Se-79	1.600E-05	3.885E-03	5.920E-07
Sr-90	9.524E+00	6.896E-02	3.524E-01
Y-90	9.527E+00	1.752E-05	3.525E-01
Tc-99	5.310E-04	3.144E-02	1.965E-05
Sb-125	1.956E-04	1.885E-07	7.238E-06
Te-125m	4.642E-05	2.549E-09	1.718E-06

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-11 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Cs-137	9.747E+00	1.121E-01	3.607E-01
Ba-137m	9.201E+00	1.710E-08	3.405E-01
Eu-154	1.004E-02	3.715E-05	3.715E-04
Pa-233	3.448E-07	1.662E-11	1.276E-08
U-234	1.234E-07	1.985E-05	4.565E-09
U-235m	9.481E-04	3.081E-11	3.508E-05
U-237	3.806E-07	4.664E-12	1.408E-08
Np-237	3.471E-07	4.925E-04	1.284E-08
Pu-238	2.564E-03	1.497E-04	9.488E-05
Pu-239	9.487E-04	1.530E-02	3.510E-05
Pu-240	9.687E-04	4.269E-03	3.584E-05
Pu-241	1.545E-02	1.493E-04	5.717E-04
Pu-242	1.560E-06	3.945E-04	5.772E-08
Am-241	6.638E-02	1.937E-02	2.456E-03
Cm-243	2.128E-04	4.341E-06	7.874E-06
Cm-244	1.042E-02	1.281E-04	3.856E-04
Total Activity:	3.811E+01		1.410E+00

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.0336	W
Heat Generated When Sealed:	0.1122	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-12 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\GC170-1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Se-79	1.340E-05	3.254E-03	4.958E-07
Sr-90	1.170E+01	8.471E-02	4.329E-01
Tc-99	4.450E-04	2.635E-02	1.647E-05
Sb-125	9.150E-03	8.819E-06	3.386E-04
Cs-137	1.180E+01	1.357E-01	4.366E-01
Eu-154	3.060E-02	1.132E-04	1.132E-03
Pu-238	2.440E-03	1.425E-04	9.028E-05
Pu-239	7.960E-04	1.283E-02	2.945E-05
Pu-240	7.940E-04	3.499E-03	2.938E-05
Pu-241	2.810E-02	2.715E-04	1.040E-03
Pu-242	1.310E-06	3.313E-04	4.847E-08
Am-241	5.650E-02	1.649E-02	2.091E-03
Cm-243	2.580E-04	5.262E-06	9.546E-06
Cm-244	1.620E-02	1.991E-04	5.994E-04
Total Activity:	2.365E+01		8.749E-01

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Se-79	1.340E-05	3.254E-03	4.958E-07
Sr-90	7.960E+00	5.763E-02	2.945E-01
Y-90	7.962E+00	1.464E-05	2.946E-01
Tc-99	4.450E-04	2.634E-02	1.646E-05
Sb-125	1.642E-04	1.583E-07	6.076E-06
Te-125m	3.897E-05	2.140E-09	1.442E-06

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-13 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Cs-137	8.157E+00	9.384E-02	3.018E-01
Ba-137m	7.701E+00	1.431E-08	2.849E-01
Eu-154	8.418E-03	3.114E-05	3.115E-04
Pa-233	2.886E-07	1.391E-11	1.068E-08
U-234	1.035E-07	1.664E-05	3.828E-09
U-235m	7.953E-04	2.585E-11	2.942E-05
U-237	3.192E-07	3.912E-12	1.181E-08
Np-237	2.905E-07	4.123E-04	1.075E-08
Pu-238	2.150E-03	1.256E-04	7.956E-05
Pu-239	7.957E-04	1.283E-02	2.944E-05
Pu-240	8.131E-04	3.583E-03	3.008E-05
Pu-241	1.296E-02	1.252E-04	4.795E-04
Pu-242	1.310E-06	3.313E-04	4.847E-08
Am-241	5.556E-02	1.622E-02	2.056E-03
Cm-243	1.783E-04	3.636E-06	6.596E-06
Cm-244	8.749E-03	1.075E-04	3.237E-04
Total Activity:	3.187E+01		1.179E+00

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.02811	W
Heat Generated When Sealed:	0.09382	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-14 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\GC171-1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Se-79	1.150E-05	2.793E-03	4.255E-07
Sr-90	1.010E+01	7.313E-02	3.737E-01
Tc-99	3.820E-04	2.262E-02	1.413E-05
Sb-125	7.860E-03	7.575E-06	2.908E-04
Cs-137	1.020E+01	1.173E-01	3.774E-01
Eu-154	2.630E-02	9.730E-05	9.731E-04
Pu-238	2.090E-03	1.220E-04	7.733E-05
Pu-239	6.830E-04	1.101E-02	2.527E-05
Pu-240	6.810E-04	3.001E-03	2.520E-05
Pu-241	2.410E-02	2.329E-04	8.917E-04
Pu-242	1.120E-06	2.832E-04	4.144E-08
Am-241	4.860E-02	1.418E-02	1.798E-03
Cm-243	2.220E-04	4.528E-06	8.214E-06
Cm-244	1.390E-02	1.708E-04	5.143E-04
Total Activity:	2.042E+01		7.557E-01

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Se-79	1.150E-05	2.793E-03	4.255E-07
Sr-90	6.871E+00	4.975E-02	2.542E-01
Y-90	6.873E+00	1.264E-05	2.543E-01
Tc-99	3.820E-04	2.262E-02	1.413E-05
Sb-125	1.411E-04	1.360E-07	5.219E-06
Te-125m	3.347E-05	1.838E-09	1.238E-06

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-15 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Cs-137	7.051E+00	8.112E-02	2.609E-01
Ba-137m	6.656E+00	1.237E-08	2.463E-01
Eu-154	7.235E-03	2.677E-05	2.677E-04
Pa-233	2.483E-07	1.196E-11	9.186E-09
U-234	8.861E-08	1.425E-05	3.279E-09
U-235m	6.824E-04	2.218E-11	2.525E-05
U-237	2.738E-07	3.355E-12	1.013E-08
Np-237	2.499E-07	3.546E-04	9.247E-09
Pu-238	1.842E-03	1.076E-04	6.814E-05
Pu-239	6.828E-04	1.101E-02	2.526E-05
Pu-240	6.974E-04	3.073E-03	2.580E-05
Pu-241	1.112E-02	1.074E-04	4.113E-04
Pu-242	1.120E-06	2.832E-04	4.144E-08
Am-241	4.779E-02	1.395E-02	1.768E-03
Cm-243	1.534E-04	3.129E-06	5.676E-06
Cm-244	7.507E-03	9.225E-05	2.777E-04
Total Activity:	2.753E+01		1.019E+00

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.02427	W
Heat Generated When Sealed:	0.08103	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-16 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\Power Hawk Tray-1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Co-60	2.220E-03	1.962E-06	8.214E-05
Se-79	1.290E-06	3.132E-04	4.773E-08
Sr-90	1.380E+00	9.992E-03	5.106E-02
Tc-99	4.270E-05	2.528E-03	1.580E-06
Cs-134	5.350E-05	4.138E-08	1.980E-06
Cs-137	6.990E+00	8.041E-02	2.586E-01
Eu-154	2.120E-02	7.843E-05	7.844E-04
Pu-238	1.140E-03	6.657E-05	4.218E-05
Pu-239	5.050E-04	8.143E-03	1.869E-05
Pu-240	5.050E-04	2.225E-03	1.869E-05
Pu-241	1.460E-02	1.411E-04	5.402E-04
Pu-242	8.280E-07	2.094E-04	3.064E-08
Am-241	5.690E-03	1.661E-03	2.105E-04
Cm-242	1.600E-12	4.833E-16	5.920E-14
Cm-243	1.210E-04	2.468E-06	4.477E-06
Cm-244	7.180E-03	8.823E-05	2.657E-04
Total Activity:	8.423E+00		3.117E-01

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	2.708E-04	2.393E-07	1.002E-05
Se-79	1.290E-06	3.132E-04	4.773E-08

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-17 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Sr-90	9.388E-01	6.797E-03	3.474E-02
Y-90	9.391E-01	1.727E-06	3.475E-02
Tc-99	4.270E-05	2.528E-03	1.580E-06
Cs-134	2.489E-07	1.925E-10	9.210E-09
Cs-137	4.832E+00	5.559E-02	1.788E-01
Ba-137m	4.562E+00	8.476E-09	1.688E-01
Eu-154	5.832E-03	2.158E-05	2.158E-04
Pa-233	2.967E-08	1.430E-12	1.098E-09
U-234	4.833E-08	7.775E-06	1.788E-09
U-235m	5.045E-04	1.640E-11	1.867E-05
U-237	1.659E-07	2.032E-12	6.137E-09
Np-237	2.987E-08	4.238E-05	1.105E-09
Pu-238	1.005E-03	5.866E-05	3.717E-05
Pu-239	5.048E-04	8.140E-03	1.868E-05
Pu-240	5.132E-04	2.262E-03	1.899E-05
Pu-241	6.734E-03	6.506E-05	2.491E-04
Pu-242	8.280E-07	2.094E-04	3.064E-08
Am-241	5.803E-03	1.693E-03	2.147E-04
Cm-243	8.361E-05	1.705E-06	3.093E-06
Cm-244	3.877E-03	4.765E-05	1.435E-04
Total Activity:	1.130E+01		4.180E-01

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.009949	W
Heat Generated When Sealed:	0.02983	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-18 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\Full Box from B Cell -1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Co-60	2.350E-04	2.077E-07	8.695E-06
Se-79	2.210E-06	5.367E-04	8.177E-08
Sr-90	2.850E+00	2.063E-02	1.055E-01
Tc-99	7.350E-05	4.352E-03	2.720E-06
Cs-137	5.390E+00	6.201E-02	1.994E-01
Eu-154	5.860E-03	2.168E-05	2.168E-04
Eu-155	2.330E-03	4.799E-06	8.621E-05
Pu-238	1.950E-03	1.139E-04	7.215E-05
Pu-239	6.480E-04	1.045E-02	2.398E-05
Pu-240	6.390E-04	2.816E-03	2.364E-05
Pu-241	1.870E-02	1.807E-04	6.919E-04
Pu-242	1.060E-06	2.681E-04	3.922E-08
Am-241	9.630E-03	2.810E-03	3.563E-04
Cm-243	4.580E-05	9.342E-07	1.695E-06
Cm-244	2.710E-03	3.330E-05	1.003E-04
Total Activity:	8.283E+00		3.065E-01

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	2.866E-05	2.533E-08	1.060E-06
Se-79	2.210E-06	5.366E-04	8.177E-08
Sr-90	1.939E+00	1.404E-02	7.174E-02
Y-90	1.939E+00	3.566E-06	7.176E-02
Tc-99	7.350E-05	4.351E-03	2.719E-06

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-19 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Cs-137	3.726E+00	4.287E-02	1.379E-01
Ba-137m	3.517E+00	6.536E-09	1.301E-01
Eu-154	1.612E-03	5.964E-06	5.965E-05
Eu-155	2.259E-04	4.654E-07	8.360E-06
Pa-233	4.990E-08	2.405E-12	1.846E-09
U-234	8.268E-08	1.330E-05	3.059E-09
U-235m	6.473E-04	2.104E-11	2.395E-05
U-237	2.124E-07	2.603E-12	7.860E-09
Np-237	5.024E-08	7.129E-05	1.859E-09
Pu-238	1.718E-03	1.003E-04	6.358E-05
Pu-239	6.477E-04	1.044E-02	2.397E-05
Pu-240	6.413E-04	2.826E-03	2.373E-05
Pu-241	8.625E-03	8.334E-05	3.191E-04
Pu-242	1.060E-06	2.681E-04	3.922E-08
Am-241	9.715E-03	2.835E-03	3.595E-04
Cm-243	3.165E-05	6.455E-07	1.171E-06
Cm-244	1.464E-03	1.798E-05	5.415E-05
Total Activity:	1.115E+01		4.124E-01

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.009524	W
Heat Generated When Sealed:	0.03112	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-20 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\Empty Box from B Cell -1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Se-79	3.110E-07	7.552E-05	1.151E-08
Sr-90	3.550E-01	2.570E-03	1.314E-02
Tc-99	1.030E-05	6.098E-04	3.811E-07
Cs-137	8.340E-01	9.594E-03	3.086E-02
Eu-154	7.630E-04	2.823E-06	2.823E-05
Pu-238	2.740E-04	1.600E-05	1.014E-05
Pu-239	6.270E-05	1.011E-03	2.320E-06
Pu-240	6.180E-05	2.723E-04	2.287E-06
Pu-241	1.800E-03	1.739E-05	6.660E-05
Pu-242	1.030E-07	2.605E-05	3.811E-09
Am-241	1.340E-03	3.911E-04	4.958E-05
Cm-243	5.730E-06	1.169E-07	2.120E-07
Cm-244	3.400E-04	4.178E-06	1.258E-05
Total Activity:	1.194E+00		4.417E-02

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Se-79	3.110E-07	7.552E-05	1.151E-08
Sr-90	2.415E-01	1.749E-03	8.936E-03
Y-90	2.416E-01	4.442E-07	8.938E-03
Tc-99	1.030E-05	6.098E-04	3.811E-07
Cs-137	5.765E-01	6.633E-03	2.133E-02
Ba-137m	5.443E-01	1.011E-09	2.014E-02
Eu-154	2.099E-04	7.766E-07	7.766E-06

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-21 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

U-234	1.162E-08	1.869E-06	4.298E-10
U-235m	6.264E-05	2.036E-12	2.318E-06
U-237	2.045E-08	2.506E-13	7.566E-10
Pu-238	2.415E-04	1.410E-05	8.934E-06
Pu-239	6.267E-05	1.011E-03	2.319E-06
Pu-240	6.212E-05	2.738E-04	2.299E-06
Pu-241	8.302E-04	8.022E-06	3.072E-05
Pu-242	1.030E-07	2.605E-05	3.811E-09
Am-241	1.338E-03	3.904E-04	4.950E-05
Cm-243	3.959E-06	8.076E-08	1.465E-07
Cm-244	1.836E-04	2.256E-06	6.794E-06
Total Activity:	1.607E+00		5.945E-02

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.001372	W
Heat Generated When Sealed:	0.00442	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-22 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\30 Gallon Drum from B Cell -1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Co-60	9.230E-05	8.156E-08	3.415E-06
Se-79	8.690E-07	2.110E-04	3.215E-08
Sr-90	1.120E+00	8.109E-03	4.144E-02
Tc-99	2.890E-05	1.711E-03	1.069E-06
Cs-137	2.120E+00	2.439E-02	7.844E-02
Eu-154	2.300E-03	8.509E-06	8.510E-05
Eu-155	9.130E-04	1.881E-06	3.378E-05
Pu-238	7.670E-04	4.479E-05	2.838E-05
Pu-239	2.540E-04	4.095E-03	9.398E-06
Pu-240	2.510E-04	1.106E-03	9.287E-06
Pu-241	7.350E-03	7.102E-05	2.720E-04
Pu-242	4.170E-07	1.055E-04	1.543E-08
Am-241	3.780E-03	1.103E-03	1.399E-04
Cm-243	1.800E-05	3.671E-07	6.660E-07
Cm-244	1.070E-03	1.315E-05	3.959E-05
Total Activity:	3.257E+00		1.205E-01

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	1.126E-05	9.948E-09	4.165E-07
Se-79	8.690E-07	2.110E-04	3.215E-08
Sr-90	7.619E-01	5.517E-03	2.819E-02

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-23 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Y-90	7.621E-01	1.402E-06	2.820E-02
Tc-99	2.890E-05	1.711E-03	1.069E-06
Cs-137	1.466E+00	1.686E-02	5.423E-02
Ba-137m	1.383E+00	2.571E-09	5.119E-02
Eu-154	6.327E-04	2.341E-06	2.341E-05
Eu-155	8.854E-05	1.824E-07	3.276E-06
Pa-233	1.959E-08	9.439E-13	7.248E-10
U-234	3.252E-08	5.231E-06	1.203E-09
U-235m	2.537E-04	8.247E-12	9.388E-06
U-237	8.350E-08	1.023E-12	3.089E-09
Np-237	1.972E-08	2.798E-05	7.297E-10
Pu-238	6.759E-04	3.947E-05	2.501E-05
Pu-239	2.539E-04	4.094E-03	9.394E-06
Pu-240	2.519E-04	1.110E-03	9.321E-06
Pu-241	3.390E-03	3.276E-05	1.254E-04
Pu-242	4.170E-07	1.055E-04	1.543E-08
Am-241	3.814E-03	1.113E-03	1.411E-04
Cm-243	1.244E-05	2.537E-07	4.602E-07
Cm-244	5.778E-04	7.101E-06	2.138E-05
Total Activity:	4.383E+00		1.622E-01

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.003745	W
Heat Generated When Sealed:	0.01223	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-24 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\B Cell ESP Frame-1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Se-79	1.580E-06	3.837E-04	5.846E-08
Sr-90	1.800E+00	1.303E-02	6.660E-02
Tc-99	5.240E-05	3.102E-03	1.939E-06
Cs-137	4.240E+00	4.878E-02	1.569E-01
Eu-154	3.880E-03	1.435E-05	1.436E-04
Pu-238	1.400E-03	8.176E-05	5.180E-05
Pu-239	3.190E-04	5.144E-03	1.180E-05
Pu-240	3.140E-04	1.384E-03	1.162E-05
Pu-241	9.170E-03	8.861E-05	3.393E-04
Pu-242	5.240E-07	1.325E-04	1.939E-08
Am-241	6.790E-03	1.982E-03	2.512E-04
Cm-243	2.910E-05	5.936E-07	1.077E-06
Cm-244	1.730E-03	2.126E-05	6.401E-05
Total Activity:	6.064E+00		2.244E-01

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Se-79	1.580E-06	3.837E-04	5.846E-08
Sr-90	1.225E+00	8.866E-03	4.531E-02
Y-90	1.225E+00	2.253E-06	4.532E-02
Tc-99	5.240E-05	3.102E-03	1.939E-06
Cs-137	2.931E+00	3.372E-02	1.085E-01
Ba-137m	2.767E+00	5.141E-09	1.024E-01
Eu-154	1.067E-03	3.949E-06	3.949E-05

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-25 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Pa-233	3.498E-08	1.686E-12	1.294E-09
U-234	5.936E-08	9.548E-06	2.196E-09
U-235m	3.187E-04	1.036E-11	1.179E-05
U-237	1.042E-07	1.277E-12	3.854E-09
Np-237	3.522E-08	4.997E-05	1.303E-09
Pu-238	1.234E-03	7.204E-05	4.565E-05
Pu-239	3.189E-04	5.141E-03	1.180E-05
Pu-240	3.157E-04	1.391E-03	1.168E-05
Pu-241	4.229E-03	4.087E-05	1.565E-04
Pu-242	5.240E-07	1.325E-04	1.939E-08
Am-241	6.779E-03	1.978E-03	2.508E-04
Cm-243	2.011E-05	4.101E-07	7.440E-07
Cm-244	9.343E-04	1.148E-05	3.457E-05
Total Activity:	8.163E+00		3.020E-01

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.006968	W
Heat Generated When Sealed:	0.02245	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-26 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\B Cell ESP Filter-1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Se-79	1.650E-07	4.007E-05	6.105E-09
Sr-90	1.880E-01	1.361E-03	6.956E-03
Tc-99	5.440E-06	3.221E-04	2.013E-07
Cs-137	4.410E-01	5.073E-03	1.632E-02
Eu-154	4.040E-04	1.495E-06	1.495E-05
Pu-238	1.450E-04	8.467E-06	5.365E-06
Pu-239	3.310E-05	5.337E-04	1.225E-06
Pu-240	3.270E-05	1.441E-04	1.210E-06
Pu-241	9.540E-04	9.218E-06	3.530E-05
Pu-242	5.440E-08	1.376E-05	2.013E-09
Am-241	7.060E-04	2.060E-04	2.612E-05
Cm-243	3.030E-06	6.180E-08	1.121E-07
Cm-244	1.800E-04	2.212E-06	6.660E-06
Total Activity:	6.315E-01		2.336E-02

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Se-79	1.650E-07	4.007E-05	6.105E-09
Sr-90	1.279E-01	9.260E-04	4.732E-03
Y-90	1.279E-01	2.353E-07	4.733E-03
Tc-99	5.440E-06	3.221E-04	2.013E-07
Cs-137	3.049E-01	3.507E-03	1.128E-02
Ba-137m	2.878E-01	5.348E-10	1.065E-02
Eu-154	1.111E-04	4.112E-07	4.112E-06

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-27 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

U-235m	3.307E-05	1.075E-12	1.223E-06
U-237	1.084E-08	1.328E-13	4.010E-10
Pu-238	1.278E-04	7.462E-06	4.728E-06
Pu-239	3.309E-05	5.335E-04	1.224E-06
Pu-240	3.287E-05	1.449E-04	1.216E-06
Pu-241	4.400E-04	4.251E-06	1.628E-05
Pu-242	5.440E-08	1.376E-05	2.013E-09
Am-241	7.049E-04	2.057E-04	2.608E-05
Cm-243	2.094E-06	4.270E-08	7.746E-08
Cm-244	9.721E-05	1.195E-06	3.597E-06
Total Activity:	8.501E-01		3.145E-02

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.0007255	W
Heat Generated When Sealed:	0.002338	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-28 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\B Cell Shop Vacuum-1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Se-79	4.160E-07	1.010E-04	1.539E-08
Sr-90	4.730E-01	3.425E-03	1.750E-02
Tc-99	1.370E-05	8.111E-04	5.069E-07
Cs-137	1.110E+00	1.277E-02	4.107E-02
Eu-154	1.020E-03	3.774E-06	3.774E-05
Pu-238	3.660E-04	2.137E-05	1.354E-05
Pu-239	8.360E-05	1.348E-03	3.093E-06
Pu-240	8.250E-05	3.636E-04	3.053E-06
Pu-241	2.410E-03	2.329E-05	8.917E-05
Pu-242	1.370E-07	3.465E-05	5.069E-09
Am-241	1.780E-03	5.195E-04	6.586E-05
Cm-243	7.640E-06	1.558E-07	2.827E-07
Cm-244	4.540E-04	5.579E-06	1.680E-05
Total Activity:	1.589E+00		5.880E-02

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Se-79	4.160E-07	1.010E-04	1.539E-08
Sr-90	3.218E-01	2.330E-03	1.191E-02
Y-90	3.219E-01	5.919E-07	1.191E-02
Tc-99	1.370E-05	8.111E-04	5.069E-07
Cs-137	7.673E-01	8.828E-03	2.839E-02
Ba-137m	7.244E-01	1.346E-09	2.680E-02
Eu-154	2.806E-04	1.038E-06	1.038E-05

U-234	1.552E-08	2.496E-06	5.742E-10
U-235m	8.351E-05	2.714E-12	3.090E-06
U-237	2.738E-08	3.355E-13	1.013E-09
Pu-238	3.225E-04	1.883E-05	1.193E-05
Pu-239	8.356E-05	1.347E-03	3.092E-06
Pu-240	8.293E-05	3.655E-04	3.069E-06
Pu-241	1.112E-03	1.074E-05	4.113E-05
Pu-242	1.370E-07	3.465E-05	5.069E-09
Am-241	1.777E-03	5.187E-04	6.576E-05
Cm-243	5.279E-06	1.077E-07	1.953E-07
Cm-244	2.452E-04	3.013E-06	9.072E-06
Total Activity:	2.139E+00		7.916E-02

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.001826	W
Heat Generated When Sealed:	0.005885	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-30 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\24-Pin Fuel Storage Container -1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Se-79	2.520E-06	6.119E-04	9.324E-08
Sr-90	2.870E+00	2.078E-02	1.062E-01
Tc-99	8.350E-05	4.944E-03	3.090E-06
Cs-137	6.760E+00	7.777E-02	2.501E-01
Eu-154	6.190E-03	2.290E-05	2.290E-04
Pu-238	2.220E-03	1.296E-04	8.214E-05
Pu-239	5.080E-04	8.191E-03	1.880E-05
Pu-240	5.010E-04	2.208E-03	1.854E-05
Pu-241	1.460E-02	1.411E-04	5.402E-04
Pu-242	8.350E-07	2.112E-04	3.090E-08
Am-241	1.080E-02	3.152E-03	3.996E-04
Cm-243	4.640E-05	9.464E-07	1.717E-06
Cm-244	2.760E-03	3.392E-05	1.021E-04
Total Activity:	9.668E+00		3.577E-01

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Se-79	2.520E-06	6.119E-04	9.324E-08
Sr-90	1.952E+00	1.414E-02	7.224E-02
Y-90	1.953E+00	3.592E-06	7.226E-02
Tc-99	8.350E-05	4.943E-03	3.089E-06
Cs-137	4.673E+00	5.376E-02	1.729E-01
Ba-137m	4.411E+00	8.197E-09	1.632E-01
Eu-154	1.703E-03	6.300E-06	6.301E-05

Pa-233	5.564E-08	2.681E-12	2.059E-09
U-234	9.412E-08	1.514E-05	3.483E-09
U-235m	5.075E-04	1.649E-11	1.878E-05
U-237	1.659E-07	2.032E-12	6.137E-09
Np-237	5.601E-08	7.948E-05	2.073E-09
Pu-238	1.956E-03	1.142E-04	7.238E-05
Pu-239	5.078E-04	8.188E-03	1.879E-05
Pu-240	5.036E-04	2.219E-03	1.863E-05
Pu-241	6.734E-03	6.506E-05	2.491E-04
Pu-242	8.350E-07	2.112E-04	3.089E-08
Am-241	1.078E-02	3.147E-03	3.990E-04
Cm-243	3.206E-05	6.539E-07	1.186E-06
Cm-244	1.491E-03	1.832E-05	5.515E-05
Total Activity:	1.301E+01		4.815E-01

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.01111	W
Heat Generated When Sealed:	0.03579	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-32 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\B Cell Work Tray No 1 - 1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Se-79	1.150E-06	2.793E-04	4.255E-08
Sr-90	1.310E+00	9.485E-03	4.847E-02
Tc-99	3.810E-05	2.256E-03	1.410E-06
Cs-137	3.090E+00	3.555E-02	1.143E-01
Eu-154	2.830E-03	1.047E-05	1.047E-04
Pu-238	1.020E-03	5.956E-05	3.774E-05
Pu-239	2.320E-04	3.741E-03	8.584E-06
Pu-240	2.290E-04	1.009E-03	8.473E-06
Pu-241	6.680E-03	6.455E-05	2.472E-04
Pu-242	3.810E-07	9.635E-05	1.410E-08
Am-241	4.950E-03	1.445E-03	1.832E-04
Cm-243	2.120E-05	4.324E-07	7.844E-07
Cm-244	1.260E-03	1.548E-05	4.662E-05
Total Activity:	4.417E+00		1.634E-01

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Se-79	1.150E-06	2.793E-04	4.255E-08
Sr-90	8.912E-01	6.453E-03	3.297E-02
Y-90	8.914E-01	1.639E-06	3.298E-02
Tc-99	3.810E-05	2.256E-03	1.410E-06
Cs-137	2.136E+00	2.457E-02	7.904E-02
Ba-137m	2.016E+00	3.747E-09	7.461E-02
Eu-154	7.785E-04	2.880E-06	2.881E-05

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-33 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Pa-233	2.550E-08	1.229E-12	9.436E-10
U-234	4.325E-08	6.956E-06	1.600E-09
U-235m	2.318E-04	7.533E-12	8.575E-06
U-237	7.589E-08	9.299E-13	2.808E-09
Np-237	2.567E-08	3.643E-05	9.499E-10
Pu-238	8.988E-04	5.249E-05	3.326E-05
Pu-239	2.319E-04	3.739E-03	8.580E-06
Pu-240	2.302E-04	1.014E-03	8.517E-06
Pu-241	3.081E-03	2.977E-05	1.140E-04
Pu-242	3.810E-07	9.635E-05	1.410E-08
Am-241	4.942E-03	1.442E-03	1.829E-04
Cm-243	1.465E-05	2.988E-07	5.420E-07
Cm-244	6.804E-04	8.362E-06	2.518E-05
Total Activity:	5.946E+00		2.200E-01

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.005076	W
Heat Generated When Sealed:	0.01635	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-34 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\B Cell Work Tray No 2 - 1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Se-79	6.510E-07	1.581E-04	2.409E-08
Sr-90	7.420E-01	5.372E-03	2.745E-02
Tc-99	2.150E-05	1.273E-03	7.955E-07
Cs-137	1.750E+00	2.013E-02	6.475E-02
Eu-154	1.600E-03	5.919E-06	5.920E-05
Pu-238	5.740E-04	3.352E-05	2.124E-05
Pu-239	1.310E-04	2.112E-03	4.847E-06
Pu-240	1.290E-04	5.685E-04	4.773E-06
Pu-241	3.770E-03	3.643E-05	1.395E-04
Pu-242	2.150E-07	5.437E-05	7.955E-09
Am-241	2.790E-03	8.142E-04	1.032E-04
Cm-243	1.200E-05	2.448E-07	4.440E-07
Cm-244	7.110E-04	8.737E-06	2.631E-05
Total Activity:	2.502E+00		9.256E-02

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Se-79	6.510E-07	1.581E-04	2.409E-08
Sr-90	5.048E-01	3.655E-03	1.868E-02
Y-90	5.049E-01	9.285E-07	1.868E-02
Tc-99	2.150E-05	1.273E-03	7.955E-07
Cs-137	1.210E+00	1.392E-02	4.476E-02
Ba-137m	1.142E+00	2.122E-09	4.226E-02
Eu-154	4.402E-04	1.628E-06	1.629E-05

Pa-233	1.437E-08	6.926E-13	5.318E-10
U-234	2.434E-08	3.915E-06	9.005E-10
U-235m	1.309E-04	4.253E-12	4.842E-06
U-237	4.283E-08	5.248E-13	1.585E-09
Np-237	1.447E-08	2.053E-05	5.354E-10
Pu-238	5.058E-04	2.954E-05	1.872E-05
Pu-239	1.309E-04	2.111E-03	4.845E-06
Pu-240	1.297E-04	5.715E-04	4.798E-06
Pu-241	1.739E-03	1.680E-05	6.433E-05
Pu-242	2.150E-07	5.437E-05	7.955E-09
Am-241	2.786E-03	8.130E-04	1.031E-04
Cm-243	8.292E-06	1.691E-07	3.068E-07
Cm-244	3.840E-04	4.718E-06	1.421E-05
Total Activity:	3.368E+00		1.246E-01

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.002874	W
Heat Generated When Sealed:	0.009261	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-36 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\10 Gallon Drum from B Cell -1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Co-60	7.910E-05	6.990E-08	2.927E-06
Se-79	7.450E-07	1.809E-04	2.757E-08
Sr-90	9.600E-01	6.951E-03	3.552E-02
Tc-99	2.480E-05	1.468E-03	9.176E-07
Cs-137	1.810E+00	2.082E-02	6.697E-02
Eu-154	1.970E-03	7.288E-06	7.289E-05
Eu-155	7.830E-04	1.613E-06	2.897E-05
Pu-238	6.570E-04	3.837E-05	2.431E-05
Pu-239	2.180E-04	3.515E-03	8.066E-06
Pu-240	2.150E-04	9.475E-04	7.955E-06
Pu-241	6.300E-03	6.087E-05	2.331E-04
Pu-242	3.570E-07	9.028E-05	1.321E-08
Am-241	3.240E-03	9.455E-04	1.199E-04
Cm-243	1.540E-05	3.141E-07	5.698E-07
Cm-244	9.130E-04	1.122E-05	3.378E-05
Total Activity:	2.784E+00		1.030E-01

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	9.647E-06	8.525E-09	3.570E-07
Se-79	7.450E-07	1.809E-04	2.756E-08
Sr-90	6.531E-01	4.729E-03	2.416E-02
Y-90	6.533E-01	1.201E-06	2.417E-02
Tc-99	2.480E-05	1.468E-03	9.176E-07

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-37 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Cs-137	1.251E+00	1.439E-02	4.630E-02
Ba-137m	1.181E+00	2.195E-09	4.370E-02
Eu-154	5.419E-04	2.005E-06	2.005E-05
Eu-155	7.593E-05	1.564E-07	2.809E-06
Pa-233	1.679E-08	8.091E-13	6.213E-10
U-234	2.786E-08	4.481E-06	1.031E-09
U-235m	2.178E-04	7.078E-12	8.058E-06
U-237	7.157E-08	8.770E-13	2.648E-09
Np-237	1.690E-08	2.399E-05	6.254E-10
Pu-238	5.790E-04	3.381E-05	2.142E-05
Pu-239	2.179E-04	3.514E-03	8.063E-06
Pu-240	2.158E-04	9.509E-04	7.984E-06
Pu-241	2.906E-03	2.808E-05	1.075E-04
Pu-242	3.570E-07	9.028E-05	1.321E-08
Am-241	3.269E-03	9.539E-04	1.209E-04
Cm-243	1.064E-05	2.170E-07	3.937E-07
Cm-244	4.931E-04	6.059E-06	1.824E-05
Total Activity:	3.747E+00		1.387E-01

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.003202	W
Heat Generated When Sealed:	0.01046	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-38 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\B Cell Crawler - 1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Se-79	1.630E-06	3.958E-04	6.031E-08
Sr-90	1.850E+00	1.339E-02	6.845E-02
Tc-99	5.380E-05	3.185E-03	1.991E-06
Cs-137	4.360E+00	5.016E-02	1.613E-01
Eu-154	3.990E-03	1.476E-05	1.476E-04
Pu-238	1.430E-03	8.351E-05	5.291E-05
Pu-239	3.280E-04	5.289E-03	1.214E-05
Pu-240	3.230E-04	1.423E-03	1.195E-05
Pu-241	9.430E-03	9.112E-05	3.489E-04
Pu-242	5.380E-07	1.361E-04	1.991E-08
Am-241	6.990E-03	2.040E-03	2.586E-04
Cm-243	2.990E-05	6.099E-07	1.106E-06
Cm-244	1.780E-03	2.187E-05	6.586E-05
Total Activity:	6.234E+00		2.307E-01

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Se-79	1.630E-06	3.958E-04	6.031E-08
Sr-90	1.259E+00	9.112E-03	4.657E-02
Y-90	1.259E+00	2.315E-06	4.658E-02
Tc-99	5.380E-05	3.185E-03	1.990E-06
Cs-137	3.014E+00	3.467E-02	1.115E-01
Ba-137m	2.845E+00	5.287E-09	1.053E-01
Eu-154	1.098E-03	4.061E-06	4.061E-05

Pa-233	3.601E-08	1.735E-12	1.332E-09
U-234	6.063E-08	9.752E-06	2.243E-09
U-235m	3.277E-04	1.065E-11	1.212E-05
U-237	1.071E-07	1.313E-12	3.964E-09
Np-237	3.625E-08	5.144E-05	1.341E-09
Pu-238	1.260E-03	7.359E-05	4.662E-05
Pu-239	3.279E-04	5.286E-03	1.213E-05
Pu-240	3.247E-04	1.431E-03	1.201E-05
Pu-241	4.349E-03	4.202E-05	1.609E-04
Pu-242	5.380E-07	1.361E-04	1.991E-08
Am-241	6.979E-03	2.037E-03	2.582E-04
Cm-243	2.066E-05	4.214E-07	7.644E-07
Cm-244	9.613E-04	1.181E-05	3.557E-05
Total Activity:	8.393E+00		3.105E-01

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.007164	W
Heat Generated When Sealed:	0.02308	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-40 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\B Cell Clamshell - 1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Se-79	1.670E-07	4.055E-05	6.179E-09
Sr-90	1.910E-01	1.383E-03	7.067E-03
Tc-99	5.530E-06	3.274E-04	2.046E-07
Cs-137	4.480E-01	5.154E-03	1.658E-02
Eu-154	4.100E-04	1.517E-06	1.517E-05
Pu-238	1.470E-04	8.584E-06	5.439E-06
Pu-239	3.370E-05	5.434E-04	1.247E-06
Pu-240	3.320E-05	1.463E-04	1.228E-06
Pu-241	9.690E-04	9.363E-06	3.585E-05
Pu-242	5.530E-08	1.399E-05	2.046E-09
Am-241	7.180E-04	2.095E-04	2.657E-05
Cm-243	3.080E-06	6.282E-08	1.140E-07
Cm-244	1.830E-04	2.249E-06	6.771E-06
Total Activity:	6.415E-01		2.374E-02

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Se-79	1.670E-07	4.055E-05	6.179E-09
Sr-90	1.299E-01	9.408E-04	4.808E-03
Y-90	1.300E-01	2.390E-07	4.809E-03
Tc-99	5.530E-06	3.274E-04	2.046E-07
Cs-137	3.097E-01	3.563E-03	1.146E-02
Ba-137m	2.924E-01	5.432E-10	1.082E-02
Eu-154	1.128E-04	4.173E-07	4.173E-06

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-41 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

U-235m	3.367E-05	1.094E-12	1.246E-06
U-237	1.101E-08	1.349E-13	4.073E-10
Pu-238	1.295E-04	7.565E-06	4.793E-06
Pu-239	3.369E-05	5.431E-04	1.246E-06
Pu-240	3.337E-05	1.471E-04	1.235E-06
Pu-241	4.469E-04	4.318E-06	1.654E-05
Pu-242	5.530E-08	1.398E-05	2.046E-09
Am-241	7.169E-04	2.092E-04	2.652E-05
Cm-243	2.128E-06	4.341E-08	7.874E-08
Cm-244	9.883E-05	1.214E-06	3.657E-06
Total Activity:	8.636E-01		3.195E-02

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.0007371	W
Heat Generated When Sealed:	0.002376	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-42 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\D Cell Dust Stop Filter - 1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Co-60	7.520E-04	6.645E-07	2.782E-05
Se-79	4.370E-07	1.061E-04	1.617E-08
Sr-90	4.670E-01	3.381E-03	1.728E-02
Tc-99	1.450E-05	8.585E-04	5.365E-07
Cs-134	1.810E-05	1.400E-08	6.697E-07
Cs-137	2.370E+00	2.726E-02	8.769E-02
Eu-154	7.170E-03	2.653E-05	2.653E-04
Pu-238	3.830E-04	2.237E-05	1.417E-05
Pu-239	1.710E-04	2.757E-03	6.327E-06
Pu-240	1.710E-04	7.536E-04	6.327E-06
Pu-241	4.940E-03	4.773E-05	1.828E-04
Pu-242	2.810E-07	7.106E-05	1.040E-08
Am-241	1.930E-03	5.632E-04	7.141E-05
Cm-242	5.420E-13	1.637E-16	2.005E-14
Cm-243	4.110E-05	8.383E-07	1.521E-06
Cm-244	2.440E-03	2.998E-05	9.028E-05
Total Activity:	2.855E+00		1.056E-01

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	9.172E-05	8.105E-08	3.394E-06
Se-79	4.370E-07	1.061E-04	1.617E-08
Sr-90	3.177E-01	2.300E-03	1.176E-02
Y-90	3.178E-01	5.844E-07	1.176E-02

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-43 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Tc-99	1.450E-05	8.584E-04	5.365E-07
Cs-134	8.421E-08	6.514E-11	3.116E-09
Cs-137	1.638E+00	1.885E-02	6.062E-02
Ba-137m	1.547E+00	2.874E-09	5.723E-02
Eu-154	1.972E-03	7.297E-06	7.298E-05
Pa-233	1.006E-08	4.849E-13	3.723E-10
U-234	1.624E-08	2.612E-06	6.008E-10
U-235m	1.708E-04	5.552E-12	6.321E-06
U-237	5.612E-08	6.877E-13	2.076E-09
Np-237	1.013E-08	1.437E-05	3.748E-10
Pu-238	3.375E-04	1.971E-05	1.249E-05
Pu-239	1.709E-04	2.756E-03	6.325E-06
Pu-240	1.738E-04	7.659E-04	6.430E-06
Pu-241	2.278E-03	2.202E-05	8.430E-05
Pu-242	2.810E-07	7.106E-05	1.040E-08
Am-241	1.968E-03	5.743E-04	7.282E-05
Cm-243	2.840E-05	5.792E-07	1.051E-06
Cm-244	1.318E-03	1.619E-05	4.875E-05
Total Activity:	3.829E+00		1.417E-01

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.003372	W
Heat Generated When Sealed:	0.01011	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-44 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\B Cell Refractory Brick - 1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Sr-90	3.250E+02	2.353E+00	1.203E+01
Cs-137	4.550E+02	5.234E+00	1.684E+01
Eu-154	5.310E-03	1.965E-05	1.965E-04
Pu-238	2.470E-04	1.442E-05	9.139E-06
Pu-239	8.320E-03	1.342E-01	3.078E-04
Pu-240	2.640E-03	1.163E-02	9.768E-05
Am-241	1.370E-03	3.998E-04	5.069E-05
Total Activity:	7.800E+02		2.886E+01

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Sr-90	2.211E+02	1.601E+00	8.181E+00
Y-90	2.212E+02	4.067E-04	8.183E+00
Cs-137	3.145E+02	3.619E+00	1.164E+01
Ba-137m	2.969E+02	5.517E-07	1.099E+01
Eu-154	1.461E-03	5.404E-06	5.405E-05
U-234	1.047E-08	1.685E-06	3.875E-10
U-235m	8.311E-03	2.701E-10	3.075E-04
Pu-238	2.177E-04	1.271E-05	8.053E-06
Pu-239	8.316E-03	1.341E-01	3.077E-04
Pu-240	2.636E-03	1.161E-02	9.752E-05
Am-241	1.335E-03	3.897E-04	4.941E-05
Total Activity:	1.054E+03		3.899E+01

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	G-45 of G-45		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.8424	W
Heat Generated When Sealed:	2.963	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	H-1 of H-5		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Attachment H

B Cell RadCalc Summary Reports

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	H-2 of H-5		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\B Cell Walls Above -9ft - 3-23-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Co-60	2.120E-01	1.873E-04	7.844E-03
Se-79	4.700E-04	1.141E-01	1.739E-05
Sr-90	7.910E+02	5.727E+00	2.927E+01
Y-90	7.910E+02	1.455E-03	2.927E+01
Tc-99	1.560E-02	9.236E-01	5.772E-04
Cs-137	1.470E+03	1.691E+01	5.439E+01
Ba-137m	1.390E+03	2.583E-06	5.143E+01
Eu-154	2.960E+00	1.095E-02	1.095E-01
Eu-155	2.300E+00	4.737E-03	8.510E-02
Pu-238	4.520E-01	2.640E-02	1.672E-02
Pu-239	1.380E-01	2.225E+00	5.106E-03
Pu-240	1.350E-01	5.949E-01	4.995E-03
Pu-241	6.750E+00	6.522E-02	2.498E-01
Pu-242	2.250E-04	5.690E-02	8.325E-06
Am-241	1.990E+00	5.807E-01	7.363E-02
Cm-243	1.270E-02	2.590E-04	4.699E-04
Cm-244	8.780E-01	1.079E-02	3.249E-02
Total Activity:	4.458E+03		1.649E+02

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:

Date to begin source decay:	3/23/2010
Date container sealed:	1/1/2026

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	2.662E-02	2.352E-05	9.850E-04
Se-79	4.700E-04	1.141E-01	1.739E-05

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	H-3 of H-5		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Sr-90	5.410E+02	3.917E+00	2.002E+01
Y-90	5.411E+02	9.951E-04	2.002E+01
Tc-99	1.560E-02	9.235E-01	5.772E-04
Cs-137	1.021E+03	1.175E+01	3.779E+01
Ba-137m	9.642E+02	1.792E-06	3.568E+01
Eu-154	8.290E-01	3.067E-03	3.067E-02
Eu-155	2.304E-01	4.745E-04	8.523E-03
Pa-233	1.031E-05	4.969E-10	3.816E-07
U-234	1.892E-05	3.043E-03	6.999E-07
U-235m	1.379E-01	4.481E-09	5.101E-03
U-236	6.252E-08	9.784E-04	2.313E-09
U-237	7.751E-05	9.498E-10	2.868E-06
Np-237	1.038E-05	1.473E-02	3.842E-07
Np-239	3.788E-08	1.633E-13	1.402E-09
Pu-238	3.990E-01	2.330E-02	1.476E-02
Pu-239	1.379E-01	2.224E+00	5.104E-03
Pu-240	1.359E-01	5.988E-01	5.027E-03
Pu-241	3.147E+00	3.040E-02	1.164E-01
Pu-242	2.250E-04	5.690E-02	8.325E-06
Am-241	2.058E+00	6.006E-01	7.614E-02
Am-243	3.790E-08	1.898E-07	1.402E-09
Cm-243	8.820E-03	1.799E-04	3.263E-04
Cm-244	4.782E-01	5.877E-03	1.769E-02
Total Activity:	3.075E+03		1.138E+02

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated on Start Date:	12.42	W
Heat Generated on Seal Date:	8.574	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	H-4 of H-5		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\B Cell Ceiling - 3-23-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Co-60	2.790E-02	2.465E-05	1.032E-03
Se-79	6.190E-05	1.503E-02	2.290E-06
Sr-90	1.040E+02	7.530E-01	3.848E+00
Y-90	1.040E+02	1.913E-04	3.848E+00
Tc-99	2.060E-03	1.220E-01	7.622E-05
Cs-137	1.940E+02	2.232E+00	7.178E+00
Ba-137m	1.840E+02	3.419E-07	6.808E+00
Eu-154	3.900E-01	1.443E-03	1.443E-02
Eu-155	3.030E-01	6.241E-04	1.121E-02
Pu-238	5.960E-02	3.480E-03	2.205E-03
Pu-239	1.810E-02	2.918E-01	6.697E-04
Pu-240	1.780E-02	7.844E-02	6.586E-04
Pu-241	8.890E-01	8.590E-03	3.289E-02
Pu-242	2.970E-05	7.511E-03	1.099E-06
Am-241	2.620E-01	7.646E-02	9.694E-03
Cm-243	1.670E-03	3.406E-05	6.179E-05
Cm-244	1.160E-01	1.425E-03	4.292E-03
Total Activity:	5.881E+02		2.176E+01

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:

Date to begin source decay:	3/23/2010
Date container sealed:	1/1/2026

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	3.503E-03	3.096E-06	1.296E-04
Se-79	6.190E-05	1.503E-02	2.290E-06

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	H-5 of H-5		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Sr-90	7.113E+01	5.150E-01	2.632E+00
Y-90	7.115E+01	1.308E-04	2.632E+00
Tc-99	2.060E-03	1.220E-01	7.622E-05
Cs-137	1.348E+02	1.551E+00	4.988E+00
Ba-137m	1.273E+02	2.365E-07	4.708E+00
Eu-154	1.092E-01	4.041E-04	4.041E-03
Eu-155	3.035E-02	6.250E-05	1.123E-03
Pa-233	1.358E-06	6.543E-11	5.024E-08
U-234	2.494E-06	4.012E-04	9.228E-08
U-235m	1.808E-02	5.877E-10	6.690E-04
U-237	1.021E-05	1.251E-10	3.777E-07
Np-237	1.367E-06	1.940E-03	5.058E-08
Pu-238	5.261E-02	3.072E-03	1.947E-03
Pu-239	1.809E-02	2.917E-01	6.694E-04
Pu-240	1.792E-02	7.895E-02	6.629E-04
Pu-241	4.144E-01	4.004E-03	1.533E-02
Pu-242	2.970E-05	7.511E-03	1.099E-06
Am-241	2.710E-01	7.907E-02	1.003E-02
Cm-243	1.160E-03	2.366E-05	4.291E-05
Cm-244	6.318E-02	7.764E-04	2.338E-03
Total Activity:	4.053E+02		1.500E+01

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated on Start Date:	1.638	W
Heat Generated on Seal Date:	1.13	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	I-1 of I-5		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Attachment I

C Cell RadCalc Summary Reports

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	I-2 of I-5		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\C Cell Floor - 1 - 1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Co-60	1.120E-05	9.897E-09	4.144E-07
Se-79	1.050E-07	2.550E-05	3.885E-09
Sr-90	1.360E-01	9.847E-04	5.032E-03
Tc-99	3.500E-06	2.072E-04	1.295E-07
Cs-137	2.560E-01	2.945E-03	9.472E-03
Eu-154	2.790E-04	1.032E-06	1.032E-05
Eu-155	1.110E-04	2.286E-07	4.107E-06
Pu-238	9.290E-05	5.425E-06	3.437E-06
Pu-239	3.080E-05	4.966E-04	1.140E-06
Pu-240	3.040E-05	1.340E-04	1.125E-06
Pu-241	8.910E-04	8.609E-06	3.297E-05
Pu-242	5.050E-08	1.277E-05	1.869E-09
Am-241	4.590E-04	1.340E-04	1.698E-05
Cm-243	2.180E-06	4.447E-08	8.066E-08
Cm-244	1.290E-04	1.585E-06	4.773E-06
Total Activity:	3.940E-01		1.458E-02

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	1.366E-06	1.207E-09	5.054E-08
Se-79	1.050E-07	2.550E-05	3.885E-09
Sr-90	9.252E-02	6.699E-04	3.423E-03
Y-90	9.255E-02	1.702E-07	3.424E-03
Tc-99	3.500E-06	2.072E-04	1.295E-07

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	I-3 of I-5		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Cs-137	1.770E-01	2.036E-03	6.548E-03
Ba-137m	1.671E-01	3.104E-10	6.181E-03
Eu-154	7.675E-05	2.840E-07	2.840E-06
Eu-155	1.076E-05	2.217E-08	3.983E-07
U-235m	3.077E-05	1.000E-12	1.138E-06
U-237	1.012E-08	1.240E-13	3.745E-10
Pu-238	8.186E-05	4.781E-06	3.029E-06
Pu-239	3.079E-05	4.964E-04	1.139E-06
Pu-240	3.051E-05	1.345E-04	1.129E-06
Pu-241	4.109E-04	3.971E-06	1.520E-05
Pu-242	5.050E-08	1.277E-05	1.868E-09
Am-241	4.631E-04	1.351E-04	1.713E-05
Cm-243	1.506E-06	3.072E-08	5.573E-08
Cm-244	6.967E-05	8.561E-07	2.578E-06
Total Activity:	5.303E-01		1.962E-02

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.0004531	W
Heat Generated When Sealed:	0.001481	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	I-4 of I-5		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\C Cell Walls - 1 - 1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Co-60	5.670E-05	5.010E-08	2.098E-06
Se-79	5.330E-07	1.294E-04	1.972E-08
Sr-90	6.880E-01	4.981E-03	2.546E-02
Tc-99	1.770E-05	1.048E-03	6.549E-07
Cs-137	1.300E+00	1.496E-02	4.810E-02
Eu-154	1.410E-03	5.217E-06	5.217E-05
Eu-155	5.610E-04	1.155E-06	2.076E-05
Pu-238	4.710E-04	2.750E-05	1.743E-05
Pu-239	1.560E-04	2.515E-03	5.772E-06
Pu-240	1.540E-04	6.787E-04	5.698E-06
Pu-241	4.500E-03	4.348E-05	1.665E-04
Pu-242	2.560E-07	6.474E-05	9.472E-09
Am-241	2.320E-03	6.771E-04	8.584E-05
Cm-243	1.100E-05	2.244E-07	4.070E-07
Cm-244	6.530E-04	8.024E-06	2.416E-05
Total Activity:	1.998E+00		7.394E-02

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	6.915E-06	6.111E-09	2.559E-07
Se-79	5.330E-07	1.294E-04	1.972E-08
Sr-90	4.681E-01	3.389E-03	1.732E-02
Y-90	4.682E-01	8.610E-07	1.732E-02
Tc-99	1.770E-05	1.048E-03	6.549E-07

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	I-5 of I-5		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Cs-137	8.987E-01	1.034E-02	3.325E-02
Ba-137m	8.484E-01	1.576E-09	3.139E-02
Eu-154	3.879E-04	1.435E-06	1.435E-05
Eu-155	5.440E-05	1.121E-07	2.013E-06
Pa-233	1.202E-08	5.793E-13	4.448E-10
U-234	1.997E-08	3.212E-06	7.389E-10
U-235m	1.558E-04	5.065E-12	5.766E-06
U-237	5.112E-08	6.264E-13	1.892E-09
Np-237	1.210E-08	1.717E-05	4.478E-10
Pu-238	4.151E-04	2.424E-05	1.536E-05
Pu-239	1.559E-04	2.514E-03	5.770E-06
Pu-240	1.546E-04	6.811E-04	5.719E-06
Pu-241	2.075E-03	2.005E-05	7.679E-05
Pu-242	2.560E-07	6.474E-05	9.472E-09
Am-241	2.340E-03	6.830E-04	8.660E-05
Cm-243	7.601E-06	1.550E-07	2.812E-07
Cm-244	3.526E-04	4.334E-06	1.305E-05
Total Activity:	2.689E+00		9.951E-02

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.002298	W
Heat Generated When Sealed:	0.007508	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	J-1 of J-3		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Attachment J

D Cell RadCalc Summary Reports

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	J-2 of J-3		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\D Cell Residual 1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Co-60	3.570E-02	3.155E-05	1.321E-03
Se-79	2.070E-05	5.027E-03	7.659E-07
Sr-90	2.220E+01	1.607E-01	8.214E-01
Tc-99	6.860E-04	4.061E-02	2.538E-05
Cs-134	8.590E-04	6.644E-07	3.178E-05
Cs-137	1.120E+02	1.288E+00	4.144E+00
Eu-154	3.400E-01	1.258E-03	1.258E-02
Pu-238	1.810E-02	1.057E-03	6.697E-04
Pu-239	8.120E-03	1.309E-01	3.004E-04
Pu-240	8.120E-03	3.578E-02	3.004E-04
Pu-241	2.340E-01	2.261E-03	8.658E-03
Pu-242	1.330E-05	3.364E-03	4.921E-07
Am-241	9.160E-02	2.673E-02	3.389E-03
Cm-242	2.570E-11	7.762E-15	9.509E-13
Cm-243	1.950E-03	3.977E-05	7.215E-05
Cm-244	1.150E-01	1.413E-03	4.255E-03
Total Activity:	1.351E+02		4.997E+00

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	4.354E-03	3.848E-06	1.611E-04
Se-79	2.070E-05	5.027E-03	7.659E-07

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	J-3 of J-3		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Sr-90	1.510E+01	1.093E-01	5.588E-01
Y-90	1.511E+01	2.778E-05	5.589E-01
Tc-99	6.860E-04	4.061E-02	2.538E-05
Cs-134	3.997E-06	3.091E-09	1.479E-07
Cs-137	7.743E+01	8.907E-01	2.865E+00
Ba-137m	7.309E+01	1.358E-07	2.704E+00
Eu-154	9.353E-02	3.460E-04	3.461E-03
Pa-233	4.776E-07	2.301E-11	1.767E-08
U-234	7.674E-07	1.234E-04	2.839E-08
U-235m	8.112E-03	2.637E-10	3.001E-04
U-237	2.658E-06	3.258E-11	9.836E-08
Np-237	4.808E-07	6.822E-04	1.779E-08
Pu-238	1.595E-02	9.314E-04	5.901E-04
Pu-239	8.117E-03	1.309E-01	3.003E-04
Pu-240	8.251E-03	3.636E-02	3.053E-04
Pu-241	1.079E-01	1.043E-03	3.993E-03
Pu-242	1.330E-05	3.363E-03	4.921E-07
Am-241	9.340E-02	2.726E-02	3.456E-03
Cm-243	1.347E-03	2.748E-05	4.985E-05
Cm-244	6.210E-02	7.632E-04	2.298E-03
Total Activity:	1.811E+02		6.702E+00

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.1595	W
Heat Generated When Sealed:	0.4783	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	K-1 of K-9		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Attachment K

REC Airlock Cell RadCalc Summary Reports

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	K-2 of K-9		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\Airlock Floor - 1 - 1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Co-60	2.030E-04	1.794E-07	7.511E-06
Se-79	1.210E-06	2.938E-04	4.477E-08
Sr-90	1.700E+00	1.231E-02	6.290E-02
Tc-99	4.020E-05	2.380E-03	1.487E-06
Cs-137	3.180E+00	3.658E-02	1.177E-01
Eu-154	4.210E-03	1.558E-05	1.558E-04
Eu-155	2.070E-03	4.264E-06	7.659E-05
Pu-238	1.100E-03	6.424E-05	4.070E-05
Pu-239	3.530E-04	5.692E-03	1.306E-05
Pu-240	3.490E-04	1.538E-03	1.291E-05
Pu-241	1.200E-02	1.160E-04	4.440E-04
Pu-242	5.790E-07	1.464E-04	2.142E-08
Am-241	5.230E-03	1.526E-03	1.935E-04
Cm-243	2.720E-05	5.548E-07	1.006E-06
Cm-244	1.690E-03	2.077E-05	6.253E-05
Total Activity:	4.907E+00		1.816E-01

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	2.476E-05	2.188E-08	9.161E-07
Se-79	1.210E-06	2.938E-04	4.477E-08
Sr-90	1.157E+00	8.374E-03	4.279E-02
Y-90	1.157E+00	2.127E-06	4.280E-02
Tc-99	4.020E-05	2.380E-03	1.487E-06

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	K-3 of K-9		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Cs-137	2.198E+00	2.529E-02	8.134E-02
Ba-137m	2.075E+00	3.856E-09	7.678E-02
Eu-154	1.158E-03	4.285E-06	4.285E-05
Eu-155	2.007E-04	4.135E-07	7.427E-06
Pa-233	2.720E-08	1.311E-12	1.006E-09
U-234	4.664E-08	7.502E-06	1.726E-09
U-235m	3.526E-04	1.146E-11	1.305E-05
U-237	1.363E-07	1.671E-12	5.044E-09
Np-237	2.738E-08	3.885E-05	1.013E-09
Pu-238	9.693E-04	5.661E-05	3.587E-05
Pu-239	3.528E-04	5.689E-03	1.306E-05
Pu-240	3.505E-04	1.545E-03	1.297E-05
Pu-241	5.535E-03	5.348E-05	2.048E-04
Pu-242	5.790E-07	1.464E-04	2.142E-08
Am-241	5.309E-03	1.549E-03	1.964E-04
Cm-243	1.879E-05	3.833E-07	6.954E-07
Cm-244	9.127E-04	1.122E-05	3.377E-05
Total Activity:	6.602E+00		2.443E-01

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.005631	W
Heat Generated When Sealed:	0.01843	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	K-4 of K-9		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\Airlock N-S Walls - 1 - 1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Co-60	1.170E-04	1.034E-07	4.329E-06
Se-79	6.970E-07	1.693E-04	2.579E-08
Sr-90	9.800E-01	7.096E-03	3.626E-02
Tc-99	2.320E-05	1.374E-03	8.584E-07
Cs-137	1.830E+00	2.105E-02	6.771E-02
Eu-154	2.430E-03	8.990E-06	8.991E-05
Eu-155	1.190E-03	2.451E-06	4.403E-05
Pu-238	6.330E-04	3.696E-05	2.342E-05
Pu-239	2.040E-04	3.289E-03	7.548E-06
Pu-240	2.010E-04	8.858E-04	7.437E-06
Pu-241	6.950E-03	6.716E-05	2.572E-04
Pu-242	3.340E-07	8.447E-05	1.236E-08
Am-241	3.010E-03	8.784E-04	1.114E-04
Cm-243	1.570E-05	3.202E-07	5.809E-07
Cm-244	9.780E-04	1.202E-05	3.619E-05
Total Activity:	2.826E+00		1.046E-01

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	1.427E-05	1.261E-08	5.280E-07
Se-79	6.970E-07	1.693E-04	2.579E-08
Sr-90	6.667E-01	4.827E-03	2.467E-02
Y-90	6.669E-01	1.226E-06	2.467E-02
Tc-99	2.320E-05	1.373E-03	8.584E-07

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	K-5 of K-9		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Cs-137	1.265E+00	1.455E-02	4.681E-02
Ba-137m	1.194E+00	2.219E-09	4.419E-02
Eu-154	6.685E-04	2.473E-06	2.473E-05
Eu-155	1.154E-04	2.377E-07	4.270E-06
Pa-233	1.565E-08	7.544E-13	5.792E-10
U-234	2.684E-08	4.317E-06	9.930E-10
U-235m	2.038E-04	6.623E-12	7.540E-06
U-237	7.895E-08	9.675E-13	2.921E-09
Np-237	1.576E-08	2.236E-05	5.831E-10
Pu-238	5.578E-04	3.257E-05	2.064E-05
Pu-239	2.039E-04	3.288E-03	7.545E-06
Pu-240	2.019E-04	8.897E-04	7.470E-06
Pu-241	3.205E-03	3.097E-05	1.186E-04
Pu-242	3.340E-07	8.446E-05	1.236E-08
Am-241	3.056E-03	8.919E-04	1.131E-04
Cm-243	1.085E-05	2.213E-07	4.014E-07
Cm-244	5.282E-04	6.490E-06	1.954E-05
Total Activity:	3.802E+00		1.407E-01

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.003243	W
Heat Generated When Sealed:	0.01061	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	K-6 of K-9		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\Airlock E-W Walls - 1 - 1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Co-60	4.070E-05	3.597E-08	1.506E-06
Se-79	2.420E-07	5.876E-05	8.954E-09
Sr-90	3.400E-01	2.462E-03	1.258E-02
Tc-99	8.050E-06	4.766E-04	2.979E-07
Cs-137	6.370E-01	7.328E-03	2.357E-02
Eu-154	8.440E-04	3.123E-06	3.123E-05
Eu-155	4.150E-04	8.548E-07	1.536E-05
Pu-238	2.190E-04	1.279E-05	8.103E-06
Pu-239	7.070E-05	1.140E-03	2.616E-06
Pu-240	6.980E-05	3.076E-04	2.583E-06
Pu-241	2.410E-03	2.329E-05	8.917E-05
Pu-242	1.160E-07	2.934E-05	4.292E-09
Am-241	1.050E-03	3.064E-04	3.885E-05
Cm-243	5.460E-06	1.114E-07	2.020E-07
Cm-244	3.390E-04	4.166E-06	1.254E-05
Total Activity:	9.825E-01		3.635E-02

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	4.964E-06	4.387E-09	1.837E-07
Se-79	2.420E-07	5.876E-05	8.954E-09
Sr-90	2.313E-01	1.675E-03	8.558E-03
Y-90	2.314E-01	4.255E-07	8.560E-03
Tc-99	8.050E-06	4.766E-04	2.978E-07

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	K-7 of K-9		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Cs-137	4.404E-01	5.066E-03	1.629E-02
Ba-137m	4.157E-01	7.724E-10	1.538E-02
Eu-154	2.322E-04	8.590E-07	8.591E-06
Eu-155	4.024E-05	8.289E-08	1.489E-06
U-235m	7.063E-05	2.295E-12	2.613E-06
U-237	2.738E-08	3.355E-13	1.013E-09
Pu-238	1.930E-04	1.127E-05	7.140E-06
Pu-239	7.067E-05	1.139E-03	2.615E-06
Pu-240	7.011E-05	3.090E-04	2.594E-06
Pu-241	1.112E-03	1.074E-05	4.113E-05
Pu-242	1.160E-07	2.934E-05	4.292E-09
Am-241	1.066E-03	3.110E-04	3.944E-05
Cm-243	3.773E-06	7.695E-08	1.396E-07
Cm-244	1.831E-04	2.250E-06	6.774E-06
Total Activity:	1.322E+00		4.891E-02

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.001127	W
Heat Generated When Sealed:	0.003689	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	K-8 of K-9		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\Airlock Ceiling - 1 - 1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Co-60	6.380E-05	5.638E-08	2.361E-06
Se-79	3.790E-07	9.203E-05	1.402E-08
Sr-90	5.330E-01	3.859E-03	1.972E-02
Tc-99	1.260E-05	7.460E-04	4.662E-07
Cs-137	9.990E-01	1.149E-02	3.696E-02
Eu-154	1.320E-03	4.884E-06	4.884E-05
Eu-155	6.500E-04	1.339E-06	2.405E-05
Pu-238	3.440E-04	2.009E-05	1.273E-05
Pu-239	1.110E-04	1.790E-03	4.107E-06
Pu-240	1.090E-04	4.803E-04	4.033E-06
Pu-241	3.780E-03	3.652E-05	1.399E-04
Pu-242	1.820E-07	4.603E-05	6.734E-09
Am-241	1.640E-03	4.786E-04	6.068E-05
Cm-243	8.550E-06	1.744E-07	3.164E-07
Cm-244	5.320E-04	6.538E-06	1.968E-05
Total Activity:	1.541E+00		5.700E-02

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	7.781E-06	6.876E-09	2.879E-07
Se-79	3.790E-07	9.203E-05	1.402E-08
Sr-90	3.626E-01	2.625E-03	1.342E-02
Y-90	3.627E-01	6.670E-07	1.342E-02
Tc-99	1.260E-05	7.459E-04	4.662E-07

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	K-9 of K-9		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Cs-137	6.906E-01	7.945E-03	2.555E-02
Ba-137m	6.519E-01	1.211E-09	2.412E-02
Eu-154	3.631E-04	1.343E-06	1.344E-05
Eu-155	6.303E-05	1.298E-07	2.332E-06
U-234	1.459E-08	2.346E-06	5.396E-10
U-235m	1.109E-04	3.604E-12	4.103E-06
U-237	4.294E-08	5.262E-13	1.589E-09
Pu-238	3.031E-04	1.770E-05	1.122E-05
Pu-239	1.110E-04	1.789E-03	4.105E-06
Pu-240	1.095E-04	4.825E-04	4.051E-06
Pu-241	1.743E-03	1.685E-05	6.450E-05
Pu-242	1.820E-07	4.603E-05	6.734E-09
Am-241	1.665E-03	4.859E-04	6.160E-05
Cm-243	5.908E-06	1.205E-07	2.186E-07
Cm-244	2.873E-04	3.531E-06	1.063E-05
Total Activity:	2.073E+00		7.669E-02

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.001768	W
Heat Generated When Sealed:	0.005784	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	L-1 of L-7		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Attachment L

REC Airlock Pipe Trench RadCalc Summary Reports

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	L-2 of L-7		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\Airlock Pipe Trench Floor - 1 - 1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Co-60	3.340E-03	2.951E-06	1.236E-04
Se-79	3.150E-05	7.649E-03	1.166E-06
Sr-90	4.060E+01	2.940E-01	1.502E+00
Tc-99	1.050E-03	6.217E-02	3.885E-05
Cs-137	7.660E+01	8.812E-01	2.834E+00
Eu-154	8.330E-02	3.082E-04	3.082E-03
Eu-155	3.310E-02	6.818E-05	1.225E-03
Pu-238	2.780E-02	1.623E-03	1.029E-03
Pu-239	9.210E-03	1.485E-01	3.408E-04
Pu-240	9.080E-03	4.001E-02	3.360E-04
Pu-241	2.660E-01	2.570E-03	9.842E-03
Pu-242	1.510E-05	3.819E-03	5.587E-07
Am-241	1.370E-01	3.998E-02	5.069E-03
Cm-243	6.510E-04	1.328E-05	2.409E-05
Cm-244	3.860E-02	4.743E-04	1.428E-03
Total Activity:	1.178E+02		4.359E+00

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	4.074E-04	3.600E-07	1.507E-05
Se-79	3.150E-05	7.649E-03	1.165E-06
Sr-90	2.762E+01	2.000E-01	1.022E+00
Y-90	2.763E+01	5.081E-05	1.022E+00
Tc-99	1.050E-03	6.216E-02	3.885E-05

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	L-3 of L-7		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Cs-137	5.295E+01	6.092E-01	1.959E+00
Ba-137m	4.999E+01	9.289E-08	1.850E+00
Eu-154	2.292E-02	8.478E-05	8.479E-04
Eu-155	3.210E-03	6.611E-06	1.188E-04
Pa-233	7.100E-07	3.421E-11	2.627E-08
U-234	1.179E-06	1.896E-04	4.361E-08
U-235m	9.200E-03	2.990E-10	3.404E-04
U-237	3.022E-06	3.703E-11	1.118E-07
Np-237	7.147E-07	1.014E-03	2.644E-08
Pu-238	2.450E-02	1.431E-03	9.064E-04
Pu-239	9.206E-03	1.484E-01	3.406E-04
Pu-240	9.113E-03	4.016E-02	3.372E-04
Pu-241	1.227E-01	1.185E-03	4.539E-03
Pu-242	1.510E-05	3.819E-03	5.587E-07
Am-241	1.382E-01	4.033E-02	5.114E-03
Cm-243	4.498E-04	9.175E-06	1.664E-05
Cm-244	2.085E-02	2.562E-04	7.713E-04
Total Activity:	1.586E+02		5.866E+00

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.1355	W
Heat Generated When Sealed:	0.4427	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	L-4 of L-7		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\Airlock Pipe Trench N-S Walls - 1 - 1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Co-60	6.110E-04	5.399E-07	2.261E-05
Se-79	5.760E-06	1.399E-03	2.131E-07
Sr-90	7.420E+00	5.372E-02	2.745E-01
Tc-99	1.920E-04	1.137E-02	7.104E-06
Cs-137	1.400E+01	1.611E-01	5.180E-01
Eu-154	1.530E-02	5.661E-05	5.661E-04
Eu-155	6.050E-03	1.246E-05	2.239E-04
Pu-238	5.080E-03	2.967E-04	1.880E-04
Pu-239	1.690E-03	2.725E-02	6.253E-05
Pu-240	1.660E-03	7.315E-03	6.142E-05
Pu-241	4.870E-02	4.706E-04	1.802E-03
Pu-242	2.770E-06	7.005E-04	1.025E-07
Am-241	2.500E-02	7.296E-03	9.250E-04
Cm-243	1.190E-04	2.427E-06	4.403E-06
Cm-244	7.060E-03	8.676E-05	2.612E-04
Total Activity:	2.153E+01		7.967E-01

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	7.452E-05	6.585E-08	2.757E-06
Se-79	5.760E-06	1.399E-03	2.131E-07
Sr-90	5.048E+00	3.655E-02	1.868E-01
Y-90	5.049E+00	9.285E-06	1.868E-01
Tc-99	1.920E-04	1.137E-02	7.104E-06

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	L-5 of L-7		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Cs-137	9.678E+00	1.113E-01	3.581E-01
Ba-137m	9.136E+00	1.698E-08	3.380E-01
Eu-154	4.209E-03	1.557E-05	1.557E-04
Eu-155	5.867E-04	1.208E-06	2.171E-05
Pa-233	1.296E-07	6.243E-12	4.794E-09
U-234	2.154E-07	3.464E-05	7.969E-09
U-235m	1.688E-03	5.487E-11	6.247E-05
U-237	5.533E-07	6.780E-12	2.047E-08
Np-237	1.304E-07	1.851E-04	4.826E-09
Pu-238	4.477E-03	2.614E-04	1.656E-04
Pu-239	1.689E-03	2.724E-02	6.250E-05
Pu-240	1.666E-03	7.342E-03	6.165E-05
Pu-241	2.246E-02	2.170E-04	8.311E-04
Pu-242	2.770E-06	7.005E-04	1.025E-07
Am-241	2.522E-02	7.361E-03	9.333E-04
Cm-243	8.222E-05	1.677E-06	3.042E-06
Cm-244	3.813E-03	4.685E-05	1.411E-04
Total Activity:	2.898E+01		1.072E+00

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.02476	W
Heat Generated When Sealed:	0.08091	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	L-6 of L-7		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\Airlock Pipe Trench E-W Walls - 1 - 1-1-10 to 1-1-26 decay.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Co-60	9.320E-04	8.236E-07	3.448E-05
Se-79	8.770E-06	2.130E-03	3.245E-07
Sr-90	1.130E+01	8.182E-02	4.181E-01
Tc-99	2.920E-04	1.729E-02	1.080E-05
Cs-137	2.130E+01	2.450E-01	7.881E-01
Eu-154	2.330E-02	8.620E-05	8.621E-04
Eu-155	9.230E-03	1.901E-05	3.415E-04
Pu-238	7.750E-03	4.526E-04	2.868E-04
Pu-239	2.570E-03	4.144E-02	9.509E-05
Pu-240	2.540E-03	1.119E-02	9.398E-05
Pu-241	7.420E-02	7.170E-04	2.745E-03
Pu-242	4.210E-06	1.065E-03	1.558E-07
Am-241	3.820E-02	1.115E-02	1.413E-03
Cm-243	1.820E-04	3.712E-06	6.734E-06
Cm-244	1.080E-02	1.327E-04	3.996E-04
Total Activity:	3.277E+01		1.212E+00

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	1.137E-04	1.004E-07	4.206E-06
Se-79	8.770E-06	2.130E-03	3.245E-07
Sr-90	7.687E+00	5.566E-02	2.844E-01
Y-90	7.689E+00	1.414E-05	2.845E-01
Tc-99	2.920E-04	1.729E-02	1.080E-05

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	L-7 of L-7		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Cs-137	1.472E+01	1.694E-01	5.448E-01
Ba-137m	1.390E+01	2.583E-08	5.143E-01
Eu-154	6.410E-03	2.371E-05	2.372E-04
Eu-155	8.951E-04	1.844E-06	3.312E-05
Pa-233	1.980E-07	9.539E-12	7.325E-09
U-234	3.286E-07	5.285E-05	1.216E-08
U-235m	2.567E-03	8.344E-11	9.499E-05
U-237	8.429E-07	1.033E-11	3.119E-08
Np-237	1.993E-07	2.828E-04	7.374E-09
Pu-238	6.829E-03	3.988E-04	2.527E-04
Pu-239	2.569E-03	4.142E-02	9.505E-05
Pu-240	2.549E-03	1.123E-02	9.432E-05
Pu-241	3.422E-02	3.307E-04	1.266E-03
Pu-242	4.210E-06	1.065E-03	1.558E-07
Am-241	3.854E-02	1.125E-02	1.426E-03
Cm-243	1.258E-04	2.565E-06	4.653E-06
Cm-244	5.832E-03	7.167E-05	2.158E-04
Total Activity:	4.410E+01		1.632E+00

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.03769	W
Heat Generated When Sealed:	0.1231	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	M-1 of M-13		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Attachment M

SMF South Cell RadCalc Summary Reports

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	M-2 of M-13		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\SMF South Cell Floor - 1-1-10 to 1-1-26.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Mn-54	8.200E-08	1.057E-11	3.034E-09
Co-60	4.720E-03	4.171E-06	1.746E-04
Sr-90	4.920E-03	3.562E-05	1.820E-04
Sb-125	5.560E-02	5.359E-05	2.057E-03
Cs-134	5.430E-05	4.200E-08	2.009E-06
Cs-137	2.050E-01	2.358E-03	7.585E-03
Eu-154	2.670E-04	9.878E-07	9.879E-06
Eu-155	2.670E-04	5.499E-07	9.879E-06
Pu-238	2.360E-06	1.378E-07	8.732E-08
Pu-239	7.790E-07	1.256E-05	2.882E-08
Pu-240	7.690E-07	3.389E-06	2.845E-08
Pu-241	2.260E-05	2.184E-07	8.362E-07
Pu-242	1.280E-09	3.237E-07	4.736E-11
Am-241	2.750E-05	8.025E-06	1.018E-06
Cm-243	5.490E-08	1.120E-09	2.031E-09
Cm-244	3.260E-06	4.006E-08	1.206E-07
Total Activity:	2.709E-01		1.002E-02

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	5.757E-04	5.087E-07	2.130E-05
Sr-90	3.347E-03	2.423E-05	1.238E-04
Y-90	3.348E-03	6.157E-09	1.239E-04
Sb-125	9.979E-04	9.617E-07	3.692E-05

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	M-3 of M-13		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Te-125m	2.368E-04	1.300E-08	8.761E-06
Cs-134	2.526E-07	1.954E-10	9.347E-09
Cs-137	1.417E-01	1.630E-03	5.244E-03
Ba-137m	1.338E-01	2.486E-10	4.950E-03
Eu-154	7.345E-05	2.717E-07	2.718E-06
Eu-155	2.589E-05	5.333E-08	9.580E-07
U-235m	7.782E-07	2.529E-14	2.879E-08
Pu-238	2.080E-06	1.214E-07	7.695E-08
Pu-239	7.787E-07	1.256E-05	2.881E-08
Pu-240	7.718E-07	3.401E-06	2.856E-08
Pu-241	1.042E-05	1.007E-07	3.857E-07
Am-241	2.720E-05	7.938E-06	1.006E-06
Cm-243	3.793E-08	7.737E-10	1.404E-09
Cm-244	1.761E-06	2.163E-08	6.514E-08
Total Activity:	2.841E-01		1.051E-02

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.0004876	W
Heat Generated When Sealed:	0.0007166	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	M-4 of M-13		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\SMF South Cell North Wall - 1-1-10 to 1-1-26.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Mn-54	5.000E-08	6.447E-12	1.850E-09
Co-60	2.880E-03	2.545E-06	1.066E-04
Sr-90	3.000E-03	2.172E-05	1.110E-04
Sb-125	3.390E-02	3.267E-05	1.254E-03
Cs-134	3.310E-05	2.560E-08	1.225E-06
Cs-137	1.250E-01	1.438E-03	4.625E-03
Eu-154	1.630E-04	6.030E-07	6.031E-06
Eu-155	1.630E-04	3.357E-07	6.031E-06
Pu-238	1.440E-06	8.409E-08	5.328E-08
Pu-239	4.750E-07	7.659E-06	1.758E-08
Pu-240	4.690E-07	2.067E-06	1.735E-08
Pu-241	1.380E-05	1.333E-07	5.106E-07
Pu-242	7.780E-10	1.968E-07	2.879E-11
Am-241	1.680E-05	4.903E-06	6.216E-07
Cm-243	3.350E-08	6.833E-10	1.240E-09
Cm-244	1.990E-06	2.445E-08	7.363E-08
Total Activity:	1.652E-01		6.111E-03

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	3.513E-04	3.104E-07	1.300E-05
Sr-90	2.041E-03	1.478E-05	7.551E-05
Y-90	2.041E-03	3.754E-09	7.553E-05
Sb-125	6.084E-04	5.864E-07	2.251E-05

Te-125m	1.444E-04	7.927E-09	5.342E-06
Cs-134	1.540E-07	1.191E-10	5.698E-09
Cs-137	8.641E-02	9.941E-04	3.197E-03
Ba-137m	8.157E-02	1.516E-10	3.018E-03
Eu-154	4.484E-05	1.659E-07	1.659E-06
Eu-155	1.581E-05	3.256E-08	5.848E-07
U-235m	4.745E-07	1.542E-14	1.756E-08
Pu-238	1.269E-06	7.410E-08	4.695E-08
Pu-239	4.748E-07	7.656E-06	1.757E-08
Pu-240	4.707E-07	2.074E-06	1.742E-08
Pu-241	6.365E-06	6.150E-08	2.355E-07
Am-241	1.662E-05	4.850E-06	6.149E-07
Cm-243	2.315E-08	4.721E-10	8.564E-10
Cm-244	1.075E-06	1.321E-08	3.976E-08
Total Activity:	1.733E-01		6.411E-03

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.0002973	W
Heat Generated When Sealed:	0.0004369	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	M-6 of M-13		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\SMF South Cell South Wall - 1-1-10 to 1-1-26.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Mn-54	7.040E-08	9.077E-12	2.605E-09
Co-60	4.050E-03	3.579E-06	1.499E-04
Sr-90	4.220E-03	3.055E-05	1.561E-04
Sb-125	4.770E-02	4.597E-05	1.765E-03
Cs-134	4.660E-05	3.605E-08	1.724E-06
Cs-137	1.760E-01	2.025E-03	6.512E-03
Eu-154	2.290E-04	8.472E-07	8.473E-06
Eu-155	2.290E-04	4.717E-07	8.473E-06
Pu-238	2.020E-06	1.180E-07	7.474E-08
Pu-239	6.690E-07	1.079E-05	2.475E-08
Pu-240	6.600E-07	2.909E-06	2.442E-08
Pu-241	1.940E-05	1.875E-07	7.178E-07
Pu-242	1.090E-09	2.757E-07	4.033E-11
Am-241	2.360E-05	6.887E-06	8.732E-07
Cm-243	4.720E-08	9.627E-10	1.746E-09
Cm-244	2.800E-06	3.441E-08	1.036E-07
Total Activity:	2.325E-01		8.603E-03

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	4.940E-04	4.365E-07	1.828E-05
Sr-90	2.871E-03	2.079E-05	1.062E-04
Y-90	2.872E-03	5.281E-09	1.062E-04
Sb-125	8.561E-04	8.251E-07	3.168E-05

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	M-7 of M-13		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Te-125m	2.031E-04	1.115E-08	7.516E-06
Cs-134	2.168E-07	1.677E-10	8.022E-09
Cs-137	1.217E-01	1.400E-03	4.502E-03
Ba-137m	1.149E-01	2.134E-10	4.250E-03
Eu-154	6.300E-05	2.331E-07	2.331E-06
Eu-155	2.221E-05	4.574E-08	8.217E-07
U-235m	6.683E-07	2.172E-14	2.473E-08
Pu-238	1.780E-06	1.039E-07	6.586E-08
Pu-239	6.687E-07	1.078E-05	2.474E-08
Pu-240	6.624E-07	2.919E-06	2.451E-08
Pu-241	8.947E-06	8.646E-08	3.311E-07
Am-241	2.334E-05	6.813E-06	8.637E-07
Cm-243	3.261E-08	6.652E-10	1.207E-09
Cm-244	1.512E-06	1.858E-08	5.595E-08
Total Activity:	2.439E-01		9.026E-03

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.0004184	W
Heat Generated When Sealed:	0.0006152	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	M-8 of M-13		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\SMF South Cell East Wall - 1-1-10 to 1-1-26.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Mn-54	1.350E-07	1.741E-11	4.995E-09
Co-60	7.750E-03	6.848E-06	2.868E-04
Sr-90	8.090E-03	5.857E-05	2.993E-04
Sb-125	9.130E-02	8.799E-05	3.378E-03
Cs-134	8.930E-05	6.907E-08	3.304E-06
Cs-137	3.370E-01	3.877E-03	1.247E-02
Eu-154	4.380E-04	1.620E-06	1.621E-05
Eu-155	4.380E-04	9.021E-07	1.621E-05
Pu-238	3.880E-06	2.266E-07	1.436E-07
Pu-239	1.280E-06	2.064E-05	4.736E-08
Pu-240	1.260E-06	5.553E-06	4.662E-08
Pu-241	3.710E-05	3.585E-07	1.373E-06
Pu-242	2.100E-09	5.311E-07	7.770E-11
Am-241	4.520E-05	1.319E-05	1.672E-06
Cm-243	9.030E-08	1.842E-09	3.341E-09
Cm-244	5.360E-06	6.587E-08	1.983E-07
Total Activity:	4.452E-01		1.647E-02

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	9.452E-04	8.353E-07	3.497E-05
Sr-90	5.504E-03	3.985E-05	2.036E-04
Y-90	5.505E-03	1.012E-08	2.037E-04
Sb-125	1.639E-03	1.579E-06	6.063E-05

Te-125m	3.888E-04	2.135E-08	1.439E-05
Cs-134	4.155E-07	3.214E-10	1.537E-08
Cs-137	2.330E-01	2.680E-03	8.620E-03
Ba-137m	2.199E-01	4.086E-10	8.137E-03
Eu-154	1.205E-04	4.458E-07	4.458E-06
Eu-155	4.247E-05	8.748E-08	1.572E-06
U-235m	1.279E-06	4.156E-14	4.731E-08
Pu-238	3.419E-06	1.997E-07	1.265E-07
Pu-239	1.279E-06	2.063E-05	4.734E-08
Pu-240	1.265E-06	5.573E-06	4.679E-08
Pu-241	1.711E-05	1.653E-07	6.331E-07
Am-241	4.471E-05	1.305E-05	1.654E-06
Cm-243	6.239E-08	1.273E-09	2.309E-09
Cm-244	2.895E-06	3.557E-08	1.071E-07
Total Activity:	4.671E-01		1.728E-02

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.000801	W
Heat Generated When Sealed:	0.001178	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	M-10 of M-13		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\SMF South Cell West Wall - 1-1-10 to 1-1-26.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Mn-54	9.680E-08	1.248E-11	3.582E-09
Co-60	5.570E-03	4.922E-06	2.061E-04
Sr-90	5.810E-03	4.207E-05	2.150E-04
Sb-125	6.560E-02	6.322E-05	2.427E-03
Cs-134	6.410E-05	4.958E-08	2.372E-06
Cs-137	2.420E-01	2.784E-03	8.954E-03
Eu-154	3.150E-04	1.165E-06	1.166E-05
Eu-155	3.150E-04	6.488E-07	1.166E-05
Pu-238	2.780E-06	1.623E-07	1.029E-07
Pu-239	9.200E-07	1.483E-05	3.404E-08
Pu-240	9.080E-07	4.001E-06	3.360E-08
Pu-241	2.660E-05	2.570E-07	9.842E-07
Pu-242	1.510E-09	3.819E-07	5.587E-11
Am-241	3.240E-05	9.455E-06	1.199E-06
Cm-243	6.490E-08	1.324E-09	2.401E-09
Cm-244	3.850E-06	4.731E-08	1.425E-07
Total Activity:	3.197E-01		1.183E-02

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	6.793E-04	6.003E-07	2.514E-05
Sr-90	3.953E-03	2.862E-05	1.462E-04
Y-90	3.954E-03	7.271E-09	1.463E-04
Sb-125	1.177E-03	1.135E-06	4.356E-05

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	M-11 of M-13		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Te-125m	2.794E-04	1.534E-08	1.034E-05
Cs-134	2.982E-07	2.307E-10	1.103E-08
Cs-137	1.673E-01	1.925E-03	6.190E-03
Ba-137m	1.579E-01	2.935E-10	5.843E-03
Eu-154	8.666E-05	3.206E-07	3.206E-06
Eu-155	3.055E-05	6.292E-08	1.130E-06
U-235m	9.191E-07	2.987E-14	3.400E-08
Pu-238	2.450E-06	1.431E-07	9.064E-08
Pu-239	9.196E-07	1.483E-05	3.403E-08
Pu-240	9.113E-07	4.016E-06	3.372E-08
Pu-241	1.227E-05	1.185E-07	4.539E-07
Am-241	3.205E-05	9.353E-06	1.186E-06
Cm-243	4.484E-08	9.147E-10	1.659E-09
Cm-244	2.079E-06	2.555E-08	7.693E-08
Total Activity:	3.354E-01		1.241E-02

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.0005754	W
Heat Generated When Sealed:	0.0008459	W

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	M-12 of M-13		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Radcalc 4.1: C:\Users\h0110065\Downloads\SMF South Cell Ceiling - 1-1-10 to 1-1-26.rad

Performed By:
Checked By:

========== Input Information ==========

Comments:

Initial Source Data:

Isotope	Ci	Gm	TBq
Mn-54	1.520E-07	1.960E-11	5.624E-09
Co-60	8.760E-03	7.741E-06	3.241E-04
Sr-90	9.140E-03	6.618E-05	3.382E-04
Sb-125	1.030E-01	9.927E-05	3.811E-03
Cs-134	1.010E-04	7.812E-08	3.737E-06
Cs-137	3.810E-01	4.383E-03	1.410E-02
Eu-154	4.950E-04	1.831E-06	1.832E-05
Eu-155	4.950E-04	1.020E-06	1.832E-05
Pu-238	4.380E-06	2.558E-07	1.621E-07
Pu-239	1.450E-06	2.338E-05	5.365E-08
Pu-240	1.430E-06	6.302E-06	5.291E-08
Pu-241	4.190E-05	4.049E-07	1.550E-06
Pu-242	2.370E-09	5.994E-07	8.769E-11
Am-241	5.110E-05	1.491E-05	1.891E-06
Cm-243	1.020E-07	2.080E-09	3.774E-09
Cm-244	6.060E-06	7.447E-08	2.242E-07
Total Activity:	5.031E-01		1.861E-02

* Radionuclides with an activity of less than 1E-08 Ci will not be shown in the output.
* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	0	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	0	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0	m^3
Waste Mass:	0	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Time to decay source before sealing: 16 yr

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	1.068E-03	9.441E-07	3.953E-05
Sr-90	6.218E-03	4.502E-05	2.301E-04
Y-90	6.220E-03	1.144E-08	2.301E-04
Sb-125	1.849E-03	1.782E-06	6.840E-05

Originator	Tom Rodovsky	**Date**	6/16/25	**Calc. No.**	ECF-324 BLDG-17-0086	**Rev. No.**	1
Checked	Rick Reeder	**Date**	6/16/25	**Sheet No**	M-13 of M-13		
Subject	Total Effective Dose Equivalent Calculation for D4 of the 324 Facility						

Te-125m	4.386E-04	2.408E-08	1.623E-05
Cs-134	4.699E-07	3.635E-10	1.739E-08
Cs-137	2.634E-01	3.030E-03	9.745E-03
Ba-137m	2.486E-01	4.620E-10	9.200E-03
Eu-154	1.362E-04	5.038E-07	5.038E-06
Eu-155	4.800E-05	9.887E-08	1.776E-06
U-235m	1.449E-06	4.708E-14	5.359E-08
Pu-238	3.860E-06	2.254E-07	1.428E-07
Pu-239	1.449E-06	2.337E-05	5.363E-08
Pu-240	1.435E-06	6.325E-06	5.310E-08
Pu-241	1.932E-05	1.867E-07	7.150E-07
Am-241	5.054E-05	1.475E-05	1.870E-06
Cm-243	7.048E-08	1.438E-09	2.608E-09
Cm-244	3.273E-06	4.022E-08	1.211E-07
Total Activity:	5.281E-01		1.954E-02

* Radionuclides with an activity of less than 1E-08 Ci are not shown in the output.

Decay Heat:

Heat Generated at Time Zero:	0.0009049	W
Heat Generated When Sealed:	0.001332	W