S

18 STA. 3 MAY 2 8 2004

ENGINEERING DATA TRANSMITTAL

1. EDT 820778

1A. Page 1 of 1

2. To: (Receiving Organization) Distribution	3. From: (Originating Organization) SST Retrieval Projects	4. Related EDT No.: N/A
		7. Purchase Order No.: N/A
5. Proj./Prog./Dept./Div.: U-200 Risk Calculation in Support of Waste Retrieval Work Plan Documents	6. Design Authority/Resp. Engr./Design Agent: K.J. Hull	9. Equip./Component No.: N/A
		10. System/Bldg./Facility: U-200-Series/241-U
8. Originator Remarks: This document is being approved and released into the supporting document system for retrievability purposes.		12. Major Assembly Dwg. No.: N/A
		13. Permit/Permit Application No.: N/A
11. Receiver Remarks: For release	11A. Design Basis Document? ☒ Yes ☒ No DGBAIDE DGBaide 5/27/04	14. Required Response Date: N/A

15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Designator	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	RPP-20995	NA	0	U-200-Series Tanks Long-Term Human Health Risk Calculations to Support Waste Retrieval Work Plan	E	1	1	1

16. KEY

Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
See TFC-ESHQ-Q-INSP-C-05	1. Approval 2. Review 3. Post-Review	1. Approved 2. Approved w/comment 3. Reviewed no comment 4. Reviewed w/comment 5. Disapproved

17. SIGNATURE/DISTRIBUTION

(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN
1	1	Design Auth.		5/28/04	57-24						
1	1	Resp. Engr. D.G. Baide	DGBaide	5/27/04	S7-70						
1	1	Resp. Mgr. W.T. Thompson		5/28/04	S7-70						
		QA									
		Safety									
1	1	Env. C.J. KEMP	CJ Kemp	5-27-04	R1-51						
1	1	Design Agent C HENDERSON		5-28-04	B2-60						
1	1	Project Engineer K.J. Hull		5/27/04	S7-70						
1	1	LONG-TERM ENVIRONMENTAL IMPACT F.M. MANN	FMann	5/28/04							

18. Signature of EDT Originator: Col Hull 5/27/04 Date	19. DOE APPROVAL (if required) Ctrl. No.	20. DGBaide 5/27/04 ~~Design Auth.~~/Resp. Engr./~~Resp. Mgr.~~ Date

BD-7400-172.2 (08/03)

U-200-Series Tanks Long-Term Human Health Risk Calculations to Support Waste Retrieval Work Plan

K.J. Hull
CH2M HILL Hanford Group, Inc.
Richland, WA 99352
U.S. Department of Energy Contract DE-AC27-99RL14047

EDT/ECN: EDT 820778 UC:
Cost Center: BA00 Charge Code: 501679
B&R Code: Total Pages: 43

Key Words: U-200-Series Tanks Risk Calculation (Calc. No. U-200 TWRP-01 in support of F&R document.

Abstract: This document provides U-200 Series tanks long-term human health risk calculations, in support of Waste Retrieval Work Plan document (RPP-20700) as required by milestone M-45-00 of the Hanford Federal Facility Agreement and Consent Order.

TRADEMARK DISCLAIMER. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

Printed in the United States of America. To obtain copies of this document, contact: Document Control Services, P.O. Box 950, Mailstop H6-08, Richland WA 99352, Phone (509) 372-2420; Fax (509) 376-4989.

Barbara Wolski 5/28/04
Release Approval Date

MAY 28 2004
DATE:
STA: 3
HANFORD RELEASE
ID: 18
Release Stamp

Approved For Public Release

DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	K.J. Hull	Date 5-3-04
Project Title/Work Order: C-200-Series Tanks Long-Term Human Health Risk Calculations to Support Waste Retrieval Work Plan		EDT No. EDT-820778
		ECN No.

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
KJ Hull	S7-70	x			
DG Baide	S7-70	x			
WT Thompson	S7-70	x			
Central Files	B1-07	x			

Figure 4. Subcontractor Calculation Review Checklist.

Page____ of ____

Subject: A-200-SERIES TANKS LONG-TERM HUMAN HEALTH RISK CALCULATIONS TO SUPPORT WASTE RETRIEVAL WORK PLAN

The subject document has been reviewed by the undersigned.
The checker reviewed and verified the following items as applicable.

Documents Reviewed: RPP-20995, REV. 0

Analysis Performed By: DOUG EVANS

- Design Input
- Basic Assumptions
- Approach/Design Methodology
- Consistency with item or document supported by the calculation
- Conclusion/Results Interpretation
- _____

Checker (printed name, signature, and date) KEVIN HULL, [signature], 5/27/04

Organizational Manager (printed name, signature and date) W.T. Thompson 5/28/04

	Calculation Cover Sheet	RPP-20995, Rev. 0 Page 1

Calculation No.: **U-200TWRP-01**	Calculation Title: **U-200-Series Tanks Long-Term Human Health Risk Calculations to Support Waste Retrieval Work Plan**
Revision No.: **0**	
Project No.: **CHG 21692/Rel.3**	Project Title **U-200-Series Tanks Waste Retrieval Work Plan**

Original and Revised Calculation/Analysis Approval

	Rev. 0 **Name/Signature/Date**	**Rev. 1** **Name/Signature/Date**	**Rev. _____** **Name/Signature/Date**
Originator:	Doug Evans 5/27/2004 Doug Evans		
Checked by:	Dwayne Crumpler 5/27/04 Dwayne Crumpler		
Approved by:			
Other:			

Record of Revision

Revision	**Reason for Revision**

Affected Documents

Document Number	**Document Title**	**Revision Number**
RPP-20700	U-200-Series Tanks Waste Retrieval Work Plan	Rev. 0

Calculation No.: U-200TWRP-01	Rev.: 0	Title: U-200-Series Tanks Long-Term Human Health Risk Calculations to Support Waste Retrieval Work Plan
Project No.: CHG 21692/Rel.3	Title: U-200-Series Tanks Waste Retrieval Work Plan	
Originated by: Date: DE 5/27/2004 Doug Evans		Checked by: Date: Dwayne Crumpler 5/27/04

1.0 INTRODUCTION

This calculation provides a pre-retrieval, screening-level assessment of long-term groundwater pathway human health risk associated with potential leaks during retrieval and potential residual waste remaining after completion of retrieval for the U-200-series tanks (U-101, U-102, U-103, U-104). A screening-level groundwater impacts perspective for the U tank farm as a whole is included. To provide additional perspective, potential risk from inadvertent post-closure human intrusion into the U-200-series tanks is also included.

This calculation supports the development of the U-200-series tanks waste retrieval work plan (RPP-20700). It is intended to meet the pre-retrieval risk information requirements for waste retrieval work plans identified in Hanford Federal Facility Agreement and Consent Order draft Change Request M-45-04-01. Because the calculation was performed before finalization of the draft change request, it may not meet the requirements upon final approval of the change request.

2.0 GROUNDWATER PATHWAY IMPACTS METHODOLOGY AND ASSUMPTIONS

The main elements of the groundwater pathway impacts calculation method can be summarized as follows:

- Focus on potential long-term groundwater pathway human health risk at the tank farm fenceline
- Address impacts from past leaks, potential retrieval leaks, and potential residual waste
- Use radiological incremental lifetime cancer risk (ILCR) and noncarcinogenic chemical hazard index (HI) as the primary health impact metrics
- Screen contaminants to identify the significant contributors (95% of total) for each health impact metric
- Derive effects of contaminant release and transport from previous studies; involves no new contaminant transport analysis
- Use the best available existing published data and information to the maximum extent possible, with little new data generated for the calculation

3.0 GROUNDWATER PATHWAY IMPACTS CALCULATION

Groundwater pathway human health impacts are calculated using the following equation.

$$R_i = I_i \times T_i \times H_i$$

Where:

i = indicator contaminant
R_i = risk metric (radiological ILCR or chemical HI)
I_i = inventory (Ci or kg released into the environment [e.g., retrieval leakage])

T_i = transport transfer function (pCi/L per Ci, or mg/L per kg)
H_i = health effects conversion factor (ILCR per pCi/L, or HI per mg/L).

All calculations are performed on an Excel spreadsheet. Calculation summary descriptions are provided in the following subsections. Calculation details are shown on the attached spreadsheet printouts. Verification of the spreadsheet in accordance with CH2M HILL Hanford Group, Inc. procedures (TFC-ENG-CHEM-D-33) was performed during the check of this calculation (see attached Spreadsheet Verification Form).

3.1 CONTAMINANT SCREENING

The groundwater pathway evaluation uses impacts from a subset of significant contaminants rather than the total impacts from all contaminants. Significant contaminants are defined as those that account for approximately 95% of the total health impacts. The primary health impact metrics used are radiological ILCR and noncarcinogenic chemical HI. Nonradiological ILCR is also included for informational purposes.

Contaminant screening is performed to identify the 95% contributors to the health impact metrics. The screening procedure involves estimating contaminant-specific contributions to the total impact from a hypothetical 100 gallon retrieval leak from each U-200-series tank. For purposes of this evaluation, the retrieval leak inventories from the U-200-series tanks are combined and treated as if they were released from a single tank.

Contaminants included in the screening procedure are the mobile long-lived contaminants of concern that previous studies (e.g., RPP-7825, RPP-7884, RPP-10098) have shown are significant contributors to peak long-term groundwater pathway impacts at the tank farm fenceline. Contaminant-specific impacts are calculated using the equation shown in Section 2.0 as the product of the estimated leak inventory (see Section 3.2), the health effects conversion factor (see Section 3.3), and the transport transfer function (see Section 3.4). The screening procedure uses the technetium-99 transfer function for technetium-99 as well as the other radionuclides and the nitrate transfer function for nitrate as well as the other chemicals (see attached Excel calculation spreadsheet).

Results show technetium-99 is the significant contaminant for radiological ILCR, contributing approximately 84% of the total radiological ILCR for the industrial scenario and 95% for the residential scenario (see attached Excel calculation spreadsheet).

Results show hexavalent chromium and nitrite are the significant contaminants for noncarcinogenic chemical HI, together contributing approximately 96% of the total HI for both the industrial and residential scenarios (see attached Excel calculation spreadsheet).

Technetium-99, hexavalent chromium and nitrite are therefore used as indicator contaminants for the U-200-series tanks groundwater impacts calculations. These contaminants are also used for the

groundwater impacts calculations for the U-100-series tanks, although no additional tank-specific screening calculations were performed for the U-100-series tanks.

3.2 INVENTORY

The indicator contaminant inventories used for the groundwater pathway calculations are consistent with the inventory data presented in RPP-20421. This calculation conservatively assumes that all chromium inventory reported in RPP-20421 is hexavalent chromium.

3.2.1 Current Inventory

U-200-series tanks current waste inventories are taken from RPP-20421, Table 5-1d. That table reflects Best-Basis Inventory estimates as of December 4, 2002. The inventories entered on the spreadsheet are for the contaminants included in the contaminant screening procedure (see attached Excel calculation spreadsheet).

3.2.2 Residual Waste Inventory

Residual waste inventories are taken from RPP-20421, Tables 5-7a through 5-7d (see attached Excel calculation spreadsheet). Those tables provide final inventories for tank residuals of 360 cubic feet (2,700 gal) and 30 cubic feet (220 gal) in the 100- and 200-series SSTs, respectively based on the selective phase retention method for sludge-filled tanks and Hanford Tank Waste Operations Simulator (HTWOS) model data for saltcake-filled tanks. The U-200-series tanks are classified as sludge-filled tanks. U tank farm ancillary equipment inventory estimates are not currently available and are not included in the evaluation.

3.2.3 Retrieval Leak Inventory

Retrieval leak inventory estimates have not been published for the U-200-series tanks and are therefore calculated as a part of this evaluation (see attached Excel calculation spreadsheet). The calculation method follows the recommendation in DOE/ORP-2003-02 (Section 6.4.2) and involves assuming the waste composition of leaks during retrieval would be the same as the waste concentrations in the final residuals.

U-200-series tanks final residual inventories are taken from RPP-20421 (see Section 3.2.2). The waste concentrations in the final residuals are calculated by dividing the residual inventories by a volume of 30 cubic feet (220 gal). The U-200-series tanks retrieval leak inventories are then calculated as the product of the concentrations and the assumed retrieval leak volume. For purposes of this evaluation, a hypothetical retrieval leak volume of 100 gal is used for the U-200-series tanks.

Retrieval leak inventory estimates for the U-100-series tanks are taken from RPP-20421, Tables 5-8a and 5-8b. These inventories are based on the HTWOS model for undiluted, water-soluble

components in a hypothetical retrieval leak volume of 8,000 gallons per tank (see attached Excel calculation spreadsheet).

3.2.4 Past Leak Inventory

U tank farm past leak inventory estimates are taken from RPP-20421, Table 4-1. That table provides inventories based on the best currently available understanding of past waste loss events in U tank farm. Four U farm tanks are currently classified as assumed leakers (tanks U-101, U-104, U-110, U-112) (HNF-EP-0182); however, currently available data support recognizing a waste loss event for only three of those tanks (tanks U-104, U-110, U-112) (see attached Excel calculation spreadsheet).

3.3 TRANSPORT TRANSFER FUNCTIONS

Contaminant transport calculations are not performed. Rather, the effects of contaminant release and transport are taken from previous studies that are the most relevant to the case being studied. For the U-200-series tanks, these are the retrieval performance evaluation work for tank S-112 (RPP-7825) and the vadose zone field investigation work for Waste Management Area S-SX (RPP-7884). Both studies involved numerical simulations of contaminant fate and transport.

Proportionality coefficients called transport transfer functions are used in lieu of performing transport simulations. Transfer functions are calculated from the RPP-7825 and RPP-7884 results by dividing the simulated peak contaminant concentrations in groundwater at the tank farm fenceline by the respective inventories released at the source. Separate transfer functions are calculated for in-tank waste (potential residual waste) and ex-tank waste (potential retrieval leaks, past leaks) (see attached Excel calculation spreadsheet).

Projected arrival time of peak groundwater concentrations at the S tank farm fenceline from in-tank waste (potential residual waste) based on the RPP-7825 simulation results is approximately the year 4000. Projected arrival time of peak groundwater concentrations at the S tank farm fenceline from ex-tank waste (potential retrieval leaks, past leaks) based on the RPP-7884 simulation results is approximately the year 2046. Because of temporal separation, the peak fenceline impacts from past leaks and retrieval leaks would not be additive with the peak fenceline impacts from residual waste.

Transfer functions are used to represent the unit contaminant concentrations in groundwater per unit inventory released at the source (pCi/L per Ci for radionuclides, mg/L per kg for chemicals). The product of the transfer function and contaminant inventory is used to provide an estimate of peak long-term groundwater concentration at the tank farm fenceline (see equation in Section 2.0).

The RPP-7884 simulation results provide data that allow ex-tank transfer functions to be calculated for technetium-99, hexavalent chromium, and nitrate. In the U-200-series tanks evaluation, the ex-tank technetium-99 transfer function is used for radionuclides and the ex-tank nitrate transfer function used for chemicals. Nitrate is used rather than hexavalent chromium for ex-tank chemical impacts because

it has the larger transfer function and therefore provides a more conservative estimate of ex-tank chemical impacts (see attached Excel calculation spreadsheet).

The RPP-7825 simulation results provide data that allow in-tank transfer functions to be calculated for technetium-99 and nitrate. In the U-200-series tanks evaluation, the in-tank technetium-99 transfer function is used for radionuclides and the nitrate transfer function is used for chemicals (see attached Excel calculation spreadsheet).

3.4 HEALTH EFFECTS CONVERSION FACTORS

Health effects conversion factors are taken directly from tables in HNF-SD-WM-TI-707 (see attached Excel calculation spreadsheet). The factors used are for exposures via the groundwater pathway. Industrial and residential exposure scenarios are included.

The health effects factors used represent the human health effects per unit contaminant concentration in groundwater (ILCR per pCi/L for radionuclides, HI per mg/L for noncarcinogenic chemicals). The product of the factors and the projected peak groundwater concentrations is used to provide an estimate of peak human health impacts (ILCR or HI) (see equation in Section 2.0).

4.0 GROUNDWATER PATHWAY IMPACTS RESULTS

Evaluation results are compiled separately by source term for potential retrieval leaks, potential residual waste, and past releases. Estimated impacts are provided in terms of peak groundwater concentrations and associated human health impacts at the tank farm fenceline for each of the indicator contaminants (technetium-99, hexavalent chromium, and nitrite).

The primary purpose for the evaluation is to provide information to aid operational decisions during U-200-series tanks waste retrieval activities. Emphasis is therefore placed on potential retrieval leak impacts from the U-200-series tanks. Evaluation results for potential retrieval leaks are provided in the form of both graphs for the U-200-series tanks and summary tables for the tanks in WMA U as a whole. Evaluation results for potential residual waste and past releases are provided only in the form of WMA-level summary tables.

4.1 POTENTIAL RETRIEVAL LEAK IMPACTS

Results for the U-200-series tanks are presented graphically using three separate graphs, one for each indicator contaminant (technetium-99, hexavalent chromium, and nitrite). Each graph shows groundwater pathway human health impacts as a function of the amount of indicator contaminant leaked during waste retrieval (see attached Excel calculation spreadsheet).

The three graphs each show two separate ex-tank (retrieval leakage) curves (sloped lines), one for the industrial scenario and another for the residential scenario. The data points for these curves are

calculated by applying the equation from Section 2.0 over a range of technetium-99, hexavalent chromium, and nitrite inventory values. Because potential retrieval leak volumes are uncertain, the inventory range is selected to encompass the current inventory in the U-200-series tanks on the high end and the inventory in a 100 gallon retrieval leak from one U-200-series tank on the low end.

As points of reference, vertical lines are added to the graphs to indicate the estimated inventory associated with the current U-200-series tank waste, a 100 gallon leak from each U-200-series tank, and a 100-gallon leak from one U-200-series tank (tank U-201 is used for informational purposes).

To provide a screening-level perspective of the U-200-series tanks retrieval leak impacts relative to other U farm tanks, potential retrieval leak impacts were evaluated for all tanks in the U tank farm. Results are summarized in two tables, one for each health impact metric (ILCR and HI). The tables provide retrieval leak impacts in terms of peak groundwater concentration, radiological ILCR, and noncarcinogenic chemical HI for each of the indicator contaminants (see attached Excel calculation spreadsheet).

The methodology used for this evaluation does not lend itself to developing a total or composite tank farm impact number but does allow for risk comparisons to be made between tanks and tank rows. This is because the transfer functions used to estimate groundwater impacts were derived from groundwater analyses (RPP-7884 and RPP-7825) performed using two-dimensional, cross-sectional models. In those analyses, impacts were calculated at the tank farm fenceline only for rows of tanks. Composite impacts from all tanks were calculated only at points of assessment downgradient of the tank farm fenceline. For consistency with the RPP-7884 and RPP-7825 analyses, the impacts shown in the U tank farm retrieval leak tables should not be summed to provide an estimate of total tank farm impacts from retrieval leakage.

4.2 POTENTIAL RESIDUAL WASTE IMPACTS

Results for potential residual waste impacts are summarized in two tables, one for each health impact metric (ILCR and HI). Each table includes all tanks in the U tank farm. The tables provide residual waste impacts in terms of peak groundwater concentration, radiological ILCR, and noncarcinogenic chemical HI for each of the indicator contaminants (see attached Excel calculation spreadsheet).

Ancillary equipment residual waste impacts are not evaluated because U tank farm ancillary equipment inventory estimates are not available.

As discussed in Section 4.1, for consistency with the RPP-7884 and RPP-7825 analyses the impacts shown in the residual waste results tables should not be summed to provide an estimate of total tank farm impacts from residual waste.

4.3 PAST LEAK IMPACTS

Results for past leak impacts are summarized in two tables, one for each health impact metric. Each table includes the waste loss events associated with tanks U-104, U-110, and U-112. The tables provide past leak impacts in terms of peak groundwater concentration, radiological ILCR, and noncarcinogenic chemical HI for each of the indicator contaminants (see attached Excel calculation spreadsheet).

As discussed in Section 4.1, for consistency with the RPP-7884 and RPP-7825 analyses the impacts shown in the past leak results tables should not be summed to provide an estimate of total tank farm impacts from past leaks.

5.0 INTRUDER IMPACTS METHODOLOGY AND ASSUMPTIONS

Inadvertent intruder impacts are analyzed using the same methodology used to analyze waste management area C intruder impacts in DOE/ORP-2003-11. The main elements of the calculation method can be summarized as follows:

- Use a time of compliance of 500 years after closure (consistent with DOE/ORP-2003-11)
- Use radiological dose as the human health impact metric
- Calculate acute dose using a drilling scenario in which an inadvertent intruder drills a well through the closed facility and brings waste to the surface (well driller scenario)
- Calculate chronic dose using two post-intruder resident scenarios in which 1) an individual plants a garden in the well cuttings (suburban resident with a garden scenario) and 2) an individual spreads the well cuttings over an area used to pasture a milk cow (rural farmer with a dairy cow scenario)
- Assume the borehole diameter is 10 inches
- Assume the U-200-series tanks each contain a volume of 30 cubic feet of residual waste at closure
- Assume the residual tank waste is embedded in a grout matrix that renders a fraction of the exhumed waste unavailable for inhalation and ingestion
- Assume intrusion occurs before contaminants have migrated from the closed facility in any significant quantity

6.0 INTRUDER IMPACTS CALCULATION

The intruder impacts calculation considers only radionuclide impacts. Impacts from chemical contaminants are not addressed. All calculations are performed on an Excel spreadsheet. Calculation summary descriptions are provided in the following subsections. Calculation details are shown on the attached spreadsheet printouts. Verification of the spreadsheet in accordance with CH2M HILL Hanford Group, Inc. procedures (TFC-ENG-CHEM-D-33) was performed during the check of this calculation (see attached Spreadsheet Verification Form).

6.1 INVENTORY

The starting inventories for the intruder calculation are the estimated radionuclide inventories in the U-200-series tanks following retrieval to the HFFACO interim retrieval goal of 30 cubic feet of residual waste. These inventories are taken from RPP-20421, Table 5-7d (see attached Excel calculation spreadsheet). That table provides final inventories for tank residuals of 30 cubic feet (220 gal) in each U-200-series tank based on the selective phase removal method. Inventories for all 46 radionuclides reported in the Best-Basis Inventory are included in the table and are used in the calculation.

Exhumed inventories are calculated by assuming the waste in the borehole has the same contaminant concentrations as the tank residuals, and that the height of the waste in the borehole is the same as the height of the waste in the tank residuals. Using these assumptions, the undecayed exhumed inventories for each radionuclide can be estimated by multiplying the tank residual inventory by the square of the ratio of the borehole radius to the tank radius, based on the following equations.

$$I_{EX} / V_{EX} = I_T / V_t$$

$$I_{EX} / (\pi r^2 h) = I_T / (\pi R^2 h)$$

$$I_{EX} = I_T \ (\pi r^2 h) / (\pi R^2 h)$$

$$I_{EX} = I_T \ (r / R)^2$$

Where:

I_{EX} = exhumed inventory (undecayed) (Ci)
I_T = tank residual inventory (Ci)
V_{EX} = exhumed volume (m^3)
V_T = tank residual volume (m^3)
r = borehole radius (m)
R = tank radius (m)
h = waste height (m)

To account for radiological decay, the exhumed inventory is multiplied by a radiological decay factor, as shown in the following equation.

$$I_{EX}(t) = I_{EX} \, Exp(-\lambda t)$$

Where:

$I_{EX}(t)$ = exhumed inventory decayed as a function of time since closure (Ci)
I_{EX} = exhumed inventory (undecayed) (Ci)
Exp = exponential function (e raised to some power)

λ = radioactive decay constant, per year, calculated as ln(2)=0.6931472 divided by the radionuclide half life in years
t = elapsed time since closure in years

6.2 DOSE

For each intruder scenario considered, the dose contribution from each radionuclide is calculated by multiplying the exhumed inventory (decayed) by a unit dose factor. The total dose for each scenario is then calculated as the sum of the dose contributions from all radionuclides included in the starting inventory. Unit dose factors for each radionuclide under each intruder scenario are taken from tables in HNF-SD-WM-TI-707. Complete scenario descriptions and unit dose factor calculations are provided in HNF-SD-WM-TI-707.

Unit dose factors for the driller scenario are taken from HNF-SD-WM-TI-707, Table 7. That table shows total dose factors (sum of internal and external doses) assuming 100% of the exhumed waste is available for inhalation and ingestion. The grout matrix is assumed to prevent a fraction of the exhumed inventory from being inhaled or ingested. Internal dose factors used in this calculation are therefore reduced by 90% (multiplied by 0.1) to account for the grouted waste form, as recommended in HNF-SD-WM-TI-707, Section 3.1 (see attached Excel calculation spreadsheet).

The driller scenario unit dose factors are given in terms of the dose per unit contaminant concentration in the drill cuttings (mrem per Ci/kg). The radiation dose to this individual is the effective dose equivalent (EDE) from acute exposure over a 40-hour drilling operation. The driller dose factors are multiplied by the average radionuclide concentration in the drill cuttings (Ci/kg) to obtain the dose. The average radionuclide concentrations in the drill cuttings are calculated by dividing the exhumed inventories (decayed) by the mass exhumed. The mass exhumed is calculated using the following equation.

$$M_{EX} = \pi r^2 h \rho$$

Where:

M_{EX} = exhumed mass (kg)
r = borehole radius (m)
h = borehole height (depth to water table) (m)
ρ = average density of well cuttings (kg/m^3)

Unit dose factors for the two post-intruder resident scenarios (suburban resident and rural farmer) are taken from HNF-SD-WM-TI-707, Tables 8 and 10, respectively. As for the driller scenario, the total dose factors (sum of internal and external doses) have been adjusted downward to account for a grout matrix by applying a waste form factor of 0.1 to the internal dose factors (see attached Excel calculation spreadsheet).

The post-intruder resident scenario unit dose factors are given in terms of the dose received during the first year per curie exhumed (mrem/yr per Ci). The radiation dose to this individual is the 50 year committed EDE from the first year of exposure. The post-intruder dose factors are multiplied by the curies exhumed (decayed) to obtain the dose.

7.0 INTRUDER IMPACTS RESULTS

Intruder calculation results are shown on separate tables for each U-200-series tank under each intruder scenario (see attached Excel calculation spreadsheet). Impacts are calculated at 100 year intervals over the period from 0 to 1000 years after closure. At the time of compliance of 500 years after closure, tank U-204 has the highest impacts of the four U-200-series tanks for all intruder scenarios considered (see attached Excel calculation spreadsheets).

The total acute dose to the driller from tank U-204 at 500 yeas after closure is 9×10^{-3} mrem EDE. The total chronic dose to the suburban resident from tank U-204 at 500 years after closure is 1×10^{-1} mrem/yr EDE. The total chronic dose to the rural farmer from tank U-204 at 500 years is 2×10^{-3} mrem/yr EDE. The total doses are dominated by the contributions from plutonium-239 and plutonium-240 for all three scenarios.

8.0 REFERENCES

DOE/ORP-2003-02, 2003, *Inventory and Source Term Data Package*, Rev. 0, U.S. Department of Energy, Richland, Washington.

DOE/ORP-2003-11, 2003, *Preliminary Performance Assessment for Waste Management Area C at the Hanford Site, Washington*, Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington.

HNF-EP-0182, 2003, *Waste Tank Summary Report for Month Ending June 30, 2003*, Rev. 183, CH2M HILL Hanford Group, Inc., Richland, Washington.

HNF-SD-WM-TI-707, 2003, *Exposure Scenarios and Unit Dose Factors for the Hanford Tank Waste Performance Assessment*, Rev. 3, U.S. Department of Energy, Richland, Washington.

RPP-7825, 2002, *Single-Shell Tank S-112 Full Scale Saltcake Waste Retrieval Technology Demonstration Functions and Requirements*, Rev. 1, CH2M HILL Hanford Group, Inc., Richland, Washington.

RPP-7884, 2002, *Field Investigation Report for Waste Management Area S-SX*, Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington.

RPP-10098, 2002, *Field Investigation Report for Waste Management Area B-BX-BY*, CH2M HILL

Hanford Group, Inc., Richland, Washington.

RPP-20421, 2004, *241-U Waste Management Area Inventory Data Package*, Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington.

RPP-20700, 2004, *U-200-Series Tanks Waste Retrieval Work Plan*, Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington.

TFC-ENG-CHEM-D-33, 2003, *Spreadsheet Verification*, Rev. B, CH2M HILL Hanford Group, Inc., Richland, Washington.

Contaminant Screening

This evaluation uses impacts from a subset of significant contaminants rather than the total impacts from all contaminants. Significant contaminants are defined as those that account for approximately 95% of the total health impacts. The primary health impact metrics used are radiological ILCR and noncarcinogenic chemical hazard index. Nonradiological ILCR is also included for informational purposes. Contaminant screening is performed to identify the 95% contributors to the health impact metrics. Contaminants included in the screening procedure are the mobile long-lived contaminants of concern that previous studies have shown are significant contributors to peak long-term groundwater pathway impacts at the tank farm fenceline. The screening procedure involves estimating contaminant-specific contributions to the total impact from a hypothetical 100 gallon retrieval leak from each U-200-series tank. For purposes of this evaluation, the retrieval leak inventories from the U-200-series tanks are combined and treated as if they were released from a single tank (400 gallon leak).

Contaminant-specific impacts are calculated as the product of the estimated leak inventory, the health effects conversion factor, and the transport transfer function. Values for those three terms are called from other sheets in this workbook (Leak Inventory, Risk Factors, Transfer Functions). The screening procedure uses the technetium-99 transfer function for technetium-99 as well as the other radionuclides, and the nitrate transfer function for nitrate, nitrite, and chromium.

Radiological ILCR

U-200-Series Tanks Mobile Long-Lived Radionuclide Contaminant of Concern Contributions to Total Groundwater Pathway Radiological Incremental Lifetime Cancer Risk

Contaminant of Concern	Inventory in 100 gal Retrieval Leak[a]						Peak Incremental Lifetime Cancer Risk		Percentage of Total ILCR	
	Units	Tank U-201	Tank U-202	Tank U-203	Tank U-204	Total	Industrial	Residential	Industrial	Residential
C-14	Ci	3.73E-05	3.68E-05	3.06E-05	3.75E-05	1.42E-04	3.09E-08	2.23E-07	6.57	2.21
Se-79	Ci	8.09E-07	8.00E-07	6.64E-07	8.18E-07	3.09E-06	3.16E-09	1.63E-08	0.67	0.16
Tc-99	Ci	2.68E-04	2.65E-04	2.20E-04	2.71E-04	1.02E-03	3.96E-07	9.63E-06	84.09	95.53
I-129	Ci	5.14E-07	5.09E-07	4.22E-07	5.18E-07	1.96E-06	4.08E-08	2.11E-07	8.66	2.09
Total							4.71E-07	1.01E-05	100.00	100.00

[a]Calculated using the method recommended in DOE/ORP-2003-02 and the data from RPP-20421 (see Leak Inventory sheet in this workbook)

Noncarcinogenic Chemical Hazard Index

U-200-Series Tanks Mobile Noncarcinogenic Chemical Contaminant of Concern Contributions to Total Groundwater Pathway Hazard Index

Contaminant of Concern	Inventory in 100 gal Retrieval Leak[a]						Peak Hazard Index		Percentage of Total Hazard Index	
	Units	Tank U-201	Tank U-202	Tank U-203	Tank U-204	Total	Industrial	Residential	Industrial	Residential
Chromium VI	kg	5.36E-01	5.32E-01	4.43E-01	1.10E-01	1.62E+00	2.74E-01	1.52E+00	68.38	65.13
Nitrite	kg	7.68E+00	7.59E+00	6.32E+00	7.77E+00	2.94E+01	1.14E-01	7.30E-01	28.35	31.26
Nitrate	kg	1.42E+01	1.40E+01	1.16E+01	1.43E+01	5.41E+01	1.31E-02	8.42E-02	3.27	3.61
Total							4.00E-01	2.34E+00	100.00	100.00

[a]Calculated using the method recommended in DOE/ORP-2003-02 and the data from RPP-20421 (see Leak Inventory sheet in this workbook)

Nonradiological Cancer Risk

In addition to radionuclides and noncarcinogenic chemicals, tank waste is also known to contain carcinogenic chemicals. Cancer risks from radionuclides and carcinogenic chemicals are typically reported as separate metrics rather than being summed because of differences in how risk is estimated for these two categories of substances. A total of 24 nonradiological chemical contaminants are included in the BBI. Of these, only one, hexavalent chromium, has a published cancer slope factor. Hexavalent chromium ILCR is included in this screening procudure for informational purposes to provide an indication of the potential magnitude of the nonradiological ILCR for the U-200-series tanks. Because it is based on only one contaminant, nonradiological ILCR is not carried forward as a separate evaluation metric. Hexavalent chromium is classified as both a chemical toxicant and a carcinogen. It is considered toxic via ingestion and carcinogenic via inhalation. The inhalation intake for the groundwater pathway exposures is based on resuspended soil and volatilized water (HNF-SD-WM-TI-707). The soil is assumed to be contaminated by irrigation with contaminated groundwater. Water volatilization is assumed to occur during showering.

U-200-Series Tanks Carcinogenic Chemical Contaminant of Concern Contributions to Total Groundwater Pathway Nonradiological Incremental Lifetime Cancer Risk

Contaminant of Concern	Inventory in 100 gal Retrieval Leak[a]						Peak Incremental Lifetime Cancer Risk		Percentage of Total ILCR	
	Units	Tank U-201	Tank U-202	Tank U-203	Tank U-204	Total	Industrial	Residential	Industrial	Residential
Chromium VI	kg	5.36E-01	5.32E-01	4.43E-01	1.10E-01	1.62E+00	1.71E-06	3.80E-06	100.00	100.00
Total							1.71E-06	3.80E-06	100.00	100.00

[a]Calculated using the method recommended in DOE/ORP-2003-02 and the data from RPP-20421 (see Leak Inventory sheet in this workbook)

Current Inventory

The U-200-series tanks current waste inventories are taken from RPP-20421, Table 5-1d. That table reflects SST Best-Basis Inventory estimates as of December 4, 2002. The inventories shown are for the contaminants included in the contaminant screening procedure.

Analyte	Units	U-201	U-202	U-203	U-204
Cr	kg	2.09E+01	1.79E+01	1.49E+01	3.14E+00
NO2	kg	2.98E+02	2.56E+02	2.12E+02	2.21E+02
NO3	kg	5.50E+02	4.72E+02	3.91E+02	4.08E+02
129I	Ci	1.99E-05	1.71E-05	1.42E-05	1.48E-05
14C	Ci	1.45E-03	1.24E-03	1.03E-03	1.07E-03
79Se	Ci	3.14E-05	2.69E-05	2.23E-05	2.33E-05
99Tc	Ci	1.04E-02	8.93E-03	7.40E-03	7.73E-03

Reference

RPP-20421, 2004, *241-U Waste Management Area Inventory Data Package*, Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington, March 2004.

Residual Waste Inventory

Residual waste inventories are taken from RPP-20421, Tables 5-7a through 5-7d. Those tables provide final inventories for tank residuals of 360 cubic feet (2,700 gal) and 30 cubic feet (220 gal) in the 100- and 200-series SSTs, respectively based on the selective phase retention (SPR) method for sludge-filled tanks and Hanford Tank Waste Operations Simulator (HTWOS) model data for saltcake-filled tanks. The U-200-series tanks are classified as sludge-filled tanks, and the inventories presented for those 4 tanks are based on the selective phase retention method.

Tank/ Inventory Method	C-14 (Ci)	Se-79 (Ci)	Tc-99 (Ci)	I-129 (Ci)	Cr (kg)	NO2 (kg)	NO3 (kg)
241-U-101/HTOWS			1.55E-01		5.57E+01	6.40E+02	
241-U-102/SPR			3.91E+00		1.43E+02	1.55E+02	
241-U-103/SPR			9.15E-01		1.87E+02	1.34E+02	
241-U-104/HTWOS			2.24E-01		5.27E+01	4.41E+02	
241-U-105/SPR			1.61E+00		2.04E+02	1.37E+02	
241-U-106/SPR			2.77E-01		4.13E+02	1.48E+02	
241-U-107/SPR			7.15E+00		2.11E+02	9.54E+01	
241-U-108/SPR			3.03E+00		1.67E+02	1.56E+02	
241-U-109/SPR			4.21E+00		1.81E+02	1.27E+02	
241-U-110/HTWOS			1.67E-01		8.35E+00	1.79E+02	
241-U-111/SPR			4.75E+00		2.65E+02	1.51E+02	
241-U-112/HTWOS			1.65E-01		7.52E+00	5.67E+01	
241-U-201/SPR	8.21E-05	1.78E-06	5.89E-04	1.13E-06	1.18E+00	1.69E+01	3.12E+01
241-U-202/SPR	8.10E-05	1.76E-06	5.84E-04	1.12E-06	1.17E+00	1.67E+01	3.08E+01
241-U-203/SPR	6.73E-05	1.46E-06	4.84E-04	9.28E-07	9.74E-01	1.39E+01	2.56E+01
241-U-204/SPR	8.26E-05	1.80E-06	5.97E-04	1.14E-06	2.43E-01	1.71E+01	3.15E+01

Reference

RPP-20421, 2004, *241-U Waste Management Area Inventory Data Package*, Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington, March 2004.

Retrieval Leak Inventory

Retrieval leak inventories are available for the U-100-series tanks in RPP-20421 but have not been published for the U-200-series tanks. The U-200-series inventories are therefore calculated using the method recommended in DOE/ORP-2003-02 (Section 6.4.2) by assuming the waste composition of leaks during retrieval would be the same as the waste concentrations in the final residuals. Final U-200-series tanks residual inventories after retrieval to the HFFACO interim retrieval goal are taken from RPP-20421 (see Residual Inventory sheet in this workbook). The waste concentrations in the U-200-series tanks final residuals are calculated by dividing the residual inventories by a volume of 30 cubic feet (220 gal). The U-200-series tanks retrieval leak inventories are then calculated as the product of the concentrations and the assumed retrieval leak volume. For purposes of this evaluation, a retrieval leak volume of 100 gal is used for the U-200-series tanks. The RPP-20421 inventories for the U-100-series tanks are based on a leak volume of 8,000 gallons per tank. It is conservatively assumed that the entire reported chromium inventory in RPP-20421 is hexavalent chromium.

U-200-Series Tanks Retrieval Leak Inventory

To provide data for the contaminant screening procedure, retrieval leak inventories for the U-200-series tanks are developed for the full set of contaminants included in the screening procedure using a hypothetical retrieval leak volume of 100 gal per tank

Tank	Contaminant of Concern	Inventory in 30 ft³ (220 gal) of Residual Waste[a]		Retrieval Fluid Concentration[b]		Assumed Retrieval Leak Volume (gal)	Retrieval Leak Inventory	
		Inventory	Units	Concentration	Units		Inventory	Units
U-201	C-14	8.21E-05	Ci	3.73E-07	Ci/gal	1.00E+02	3.73E-05	Ci
	Se-79	1.76E-06	Ci	8.09E-09	Ci/gal	1.00E+02	8.09E-07	Ci
	Tc-99	5.89E-04	Ci	2.68E-06	Ci/gal	1.00E+02	2.68E-04	Ci
	I-129	1.13E-06	Ci	5.14E-09	Ci/gal	1.00E+02	5.14E-07	Ci
	chromium VI	1.18E+00	kg	5.36E-03	kg/gal	1.00E+02	5.36E-01	kg
	nitrite	1.69E+01	kg	7.68E-02	kg/gal	1.00E+02	7.68E+00	kg
	nitrate	3.12E+01	kg	1.42E-01	kg/gal	1.00E+02	1.42E+01	kg
U-202	C-14	8.10E-05	Ci	3.68E-07	Ci/gal	1.00E+02	3.68E-05	Ci
	Se-79	1.76E-06	Ci	8.00E-09	Ci/gal	1.00E+02	8.00E-07	Ci
	Tc-99	5.84E-04	Ci	2.65E-06	Ci/gal	1.00E+02	2.65E-04	Ci
	I-129	1.12E-06	Ci	5.09E-09	Ci/gal	1.00E+02	5.09E-07	Ci
	chromium VI	1.17E+00	kg	5.32E-03	kg/gal	1.00E+02	5.32E-01	kg
	nitrite	1.67E+01	kg	7.59E-02	kg/gal	1.00E+02	7.59E+00	kg
	nitrate	3.08E+01	kg	1.40E-01	kg/gal	1.00E+02	1.40E+01	kg
U-203	C-14	6.73E-05	Ci	3.06E-07	Ci/gal	1.00E+02	3.06E-05	Ci
	Se-79	1.46E-06	Ci	6.64E-09	Ci/gal	1.00E+02	6.64E-07	Ci
	Tc-99	4.84E-04	Ci	2.20E-06	Ci/gal	1.00E+02	2.20E-04	Ci
	I-129	9.28E-07	Ci	4.22E-09	Ci/gal	1.00E+02	4.22E-07	Ci
	chromium VI	9.74E-01	kg	4.43E-03	kg/gal	1.00E+02	4.43E-01	kg
	nitrite	1.39E+01	kg	6.32E-02	kg/gal	1.00E+02	6.32E+00	kg
	nitrate	2.56E+01	kg	1.16E-01	kg/gal	1.00E+02	1.16E+01	kg
U-204	C-14	8.26E-05	Ci	3.75E-07	Ci/gal	1.00E+02	3.75E-05	Ci
	Se-79	1.80E-06	Ci	8.18E-09	Ci/gal	1.00E+02	8.18E-07	Ci
	Tc-99	5.97E-04	Ci	2.71E-06	Ci/gal	1.00E+02	2.71E-04	Ci
	I-129	1.14E-06	Ci	5.18E-09	Ci/gal	1.00E+02	5.18E-07	Ci
	chromium VI	2.43E-01	kg	1.10E-03	kg/gal	1.00E+02	1.10E-01	kg
	nitrite	1.71E+01	kg	7.77E-02	kg/gal	1.00E+02	7.77E+00	kg
	nitrate	3.15E+01	kg	1.43E-01	kg/gal	1.00E+02	1.43E+01	kg

[a]Source = RPP-20421, Table 5-7d. Values shown for chromium (VI) assume entire reported chromium inventory is hexavalent chromium.

[b]Calculated as residual inventory divided by residual volume of 220 gal.

U Tank Farm Retrieval Leak Inventory

Indicator contaminant retrieval leak inventories for the U-100-series tanks are taken from RPP-20421, Tables 5-8a and 5-8b. The inventories are for a hypothetical retrieval leak volume of 8,000 gal per tank. Retrieval leak inventories for the U-200-series tanks are calculated above based on a hypothetical retrieval leak volume of 100 gal per tank.

Tank	Indicator Contaminant	Assumed Retrieval Leak Volume (gal)	Retrieval Leak Inventory	
			Inventory	Units
U-101[a]	Tc-99	8.00E+03	2.40E-02	Ci
	chromium VI	8.00E+03	4.46E+00	kg
	nitrite	8.00E+03	1.08E+02	kg
U-102[a]	Tc-99	8.00E+03	8.70E-01	Ci
	chromium VI	8.00E+03	1.20E+01	kg
	nitrite	8.00E+03	1.05E+03	kg
U-103[a]	Tc-99	8.00E+03	1.54E+00	Ci
	chromium VI	8.00E+03	2.16E+01	kg
	nitrite	8.00E+03	9.17E+02	kg
U-104[a]	Tc-99	8.00E+03	8.40E-02	Ci
	chromium VI	8.00E+03	1.25E+01	kg
	nitrite	8.00E+03	1.93E+02	kg
U-105[a]	Tc-99	8.00E+03	2.48E+00	Ci
	chromium VI	8.00E+03	5.38E+00	kg
	nitrite	8.00E+03	8.87E+02	kg
U-106[a]	Tc-99	8.00E+03	1.99E+00	Ci
	chromium VI	8.00E+03	5.28E+00	kg
	nitrite	8.00E+03	1.06E+03	kg
U-107[a]	Tc-99	8.00E+03	9.24E-01	Ci
	chromium VI	8.00E+03	1.28E+01	kg
	nitrite	8.00E+03	6.23E+02	kg
U-108[a]	Tc-99	8.00E+03	1.17E+00	Ci
	chromium VI	8.00E+03	8.26E+00	kg
	nitrite	8.00E+03	1.07E+03	kg
U-109[a]	Tc-99	8.00E+03	8.95E-01	Ci
	chromium VI	8.00E+03	1.15E+01	kg
	nitrite	8.00E+03	8.50E+02	kg
U-110[a]	Tc-99	8.00E+03	2.70E-02	Ci
	chromium VI	8.00E+03	1.38E+00	kg
	nitrite	8.00E+03	4.84E+01	kg
U-111[a]	Tc-99	8.00E+03	1.28E+00	Ci
	chromium VI	8.00E+03	1.99E+01	kg
	nitrite	8.00E+03	1.01E+03	kg
U-112[a]	Tc-99	8.00E+03	3.00E-02	Ci
	chromium VI	8.00E+03	7.18E-01	kg
	nitrite	8.00E+03	1.19E+01	kg
U-201[b]	Tc-99	1.00E+02	2.68E-04	Ci
	chromium VI	1.00E+02	5.36E-01	kg
	nitrite	1.00E+02	7.68E+00	kg
U-202[b]	Tc-99	1.00E+02	2.65E-04	Ci
	chromium VI	1.00E+02	5.32E-01	kg
	nitrite	1.00E+02	7.59E+00	kg
U-203[b]	Tc-99	1.00E+02	2.20E-04	Ci
	chromium VI	1.00E+02	4.43E-01	kg
	nitrite	1.00E+02	6.32E+00	kg
U-204[b]	Tc-99	1.00E+02	2.71E-04	Ci
	chromium VI	1.00E+02	1.10E-01	kg
	nitrite	1.00E+02	7.77E+00	kg

[a]Source = RPP-20421, Tables 5-8a and 5-8b. Values shown for chromium (VI) assume entire reported chromium inventory is hexavalent chromium.

[b]Calculated based on waste composition in 30 cubic feet of final residuals (see table above on this sheet)

Past Leak Inventory

U tank farm past leak inventory estimates are developed for the indicator contaminants based on the best currently available understanding of past waste loss events in U tank farm. Four U farm tanks are currently classified as assumed leakers in HNF-EP-0182 (U-101, U-104, U-110, U-112). However, information in DOE/ORP-2003-02 (Section 6.4.1.6, p. 6-31) and RPP-20421 indicates that the preponderance of currently available data, including data from baseline spectral gamma logging of U tank farm drywells (SJO-HAN-8), supports recognizing three pre-existing sources of vadose zone contamination (past leaks) in the U tank farm, in the vicinities of tanks U-104, U-110, and U-112. Currently available data do not support recognizing a pre-existing source of vadose zone contamination in the vicinity of tank U-101. Inventory estimates are taken from Table 4-1 of RPP-20421.

U Farm Past Leak Inventory

Tank	Tc-99 (Ci)[b]	Chromium (VI) (kg)[b]	Nitrite (kg)[b]
U-101[a]	0.00E+00	0.00E+00	0.00E+00
U-102	*0.00E+00*	*0.00E+00*	*0.00E+00*
U-103	0.00E+00	0.00E+00	0.00E+00
U-104[a]	1.79E+00	1.59E+01	4.03E+02
U-105	0.00E+00	0.00E+00	0.00E+00
U-106	0.00E+00	0.00E+00	0.00E+00
U-107	0.00E+00	0.00E+00	0.00E+00
U-108	0.00E+00	0.00E+00	0.00E+00
U-109	0.00E+00	0.00E+00	0.00E+00
U-110[a]	6.20E-01	2.54E+01	6.43E+02
U-111	0.00E+00	0.00E+00	0.00E+00
U-112[a]	7.88E-01	1.59E+02	1.21E+03
U-201	0.00E+00	0.00E+00	0.00E+00
U-202	0.00E+00	0.00E+00	0.00E+00
U-203	0.00E+00	0.00E+00	0.00E+00
U-204	*0.00E+00*	*0.00E+00*	*0.00E+00*

[a]Tank is classified an assumed leaker in HNF-EP-0182.

[b]Source = RPP-20421, Table 4.1. Values shown for chromium (VI) assume entire reported chromium inventory is hexavalent chromium.

References

DOE/ORP-2003-02, 2003, *Inventory and Source Term Data Package*, Rev. 0, U.S. Department of Energy, Office of River Protection, Richland, Washington, April 2003.
HNF-EP-0182, 2003, *Waste Tank Summary Report for Month Ending June 30, 2003*, Rev. 183, CH2M HILL Hanford Group, Inc., Richland, Washington.
RPP-20421, 2004, *241-U Waste Management Area Inventory Data Package*, Rev. 0. CH2M HILL Hanford Group, Inc., Richland, Washington, March 2004.

Contaminant Transport Transfer Functions

Proportionality coefficients called transport transfer functions are used in lieu of performing new contaminant fate and transport modeling. The transfer functions are derived from the results of the most sophisticated long-term groundwater impacts analyses currently available. A site-specific groundwater impacts analysis is not currently available for U tank farm. Therefore, analyses of groundwater impacts from the nearby S tank farm are used instead. Separate transfer functions are developed for ex-tank or leaked waste (past leaks and potential retrieval leaks) and in-tank or residual waste (tank and ancillary equipment residuals). Transfer functions are used to represent the unit contaminant concentrations in groundwater per unit inventory released at the source. The product of the transfer function and the contaminant inventory estimate for a particular source term provides an estimate of the projected peak long-term groundwater concentration from that source term.

Ex-Tank Waste (Past Leaks and Retrieval Leaks)

Ex-tank transfer functions are derived from the results of an S tank farm groundwater impacts analysis presented in RPP-7884. The RPP-7884 analysis focused solely on impacts from past releases. Retrieval leaks and residual waste were not included. Three mobile contaminants of concern were directly included in the RPP-7884 simulations, technetium-99, nitrate, and hexavalent chromium. All three contaminants were simulated as being unretarded during subsurface transport (distribution coefficient = 0 mL/g). Mobile but moderately retarded contaminants were not simulated. The period of analysis was 1,000 years. Projected arrival times of peak groundwater concentrations at the S tank farm fenceline were approximately the year 2046 for all three contaminants.

Ex-tank transfer functions are developed below for each of the RPP-7884 simulated contaminants by dividing the simulated peak groundwater concentrations at the tank farm fenceline by the contaminant inventories released at the source. In the U-200-series tanks analysis, the technetium-99 transfer function is used to evaluate ex-tank impacts from radionuclides and the nitrate transfer function is used to evaluate ex-tank impacts from chemicals. Nitrate is used rather than hexavalent chromium for chemical impacts because it has the larger transfer function and therefore provides more conservative impact estimates.

Technetium-99	2.80E+04	pCi/L per Ci
Peak Tc-99 groundwater concentration at fenceline across cross section projection from S-104 past leak (RPP-7884, Table G.3, cross-sect S-CC', Case 1) =	1.08E+05	pCi/L
Tc-99 inventory in S-104 past leak (RPP-7884, Table 3.4) =	3.87	Ci

Hexavalent Chromium	2.83E-03	mg/L per kg
Peak chromium groundwater concentration at fenceline across cross section projection from S-104 past leak (RPP-7884, Table G.3, cross-sect S-CC', Case 1) =	2.21E+00	mg/L
Cr (VI) inventory in S-104 past leak (RPP-7884, Table 3.4) =	7.81E+02	kg

Nitrate	3.91E-02	mg/L per kg
Peak nitrate groundwater concentration at fenceline across cross section projection from S-104 past leak (RPP-7884, Table G.3, cross-sect S-CC', Case 1) =	6.65E+02	mg/L
Nitrate inventory in S-104 past leak (RPP-7884, Table 3.4) =	1.70E+04	kg

Reference

RPP-7884, 2002, *Field Investigation Report for Waste Management Area S-SX*, Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington

In-Tank Waste (Tank and Ancillary Equipment Residuals)

In-tank transfer functions are derived from the results of an S tank farm groundwater impacts analysis presented in RPP-7825. The RPP-7825 analysis is broader in scope than the RPP-7884 analysis and includes long-term groundwater impacts from residual waste. The RPP-7825 simulations directly included three contaminants of concern, technetium-99, nitrate, and uranium-238. Technetium-99 and nitrate were simulated as being unretarded during subsurface transport (distribution coefficient = 0 mL/g). Uranium was simulated as being moderately retarded (distribution coefficient = 0.6 mL/g). The period of analysis was 10,000 years. Projected arrival times of peak groundwater concentrations at the tank farm fenceline were approximately the year 4000 for the two mobile contaminants and the year 12,000 for uranium-238.

In-tank transfer functions are developed below for the two mobile RPP-7825 contaminants by dividing the simulated peak groundwater concentrations at the tank farm fenceline by the contaminant inventories released at the source. An in-tank transfer function is not developed for uranium-238 because the RPP-7825 analysis showed that due to its lower mobility uranium-238 would make little or no contribution to the risk at the time of peak for residual waste (year 4000). The peak risk from residual waste was driven by the highly mobile contaminants with distribution coefficients = 0 mL/g. Uranium-238 concentrations in the groundwater at the tank farm fenceline were projected to begin rising in approximately the year 8000 and were projected not to have peaked within the 10,000 year analysis period. In the U-200-series tanks analysis, the technetium-99 transfer function is used to evaluate in-tank impacts from radionuclides and the nitrate transfer function is used to evaluate in-tank impacts from chemicals.

Technetium-99	1.77E+02	pCi/L per Ci
Peak Tc-99 groundwater concentration at fenceline for 2700 gal residual waste in tank S-112 (RPP-7825, Table B.5.4) =	1.51E+02	pCi/L
Tc-99 inventory in 2700 gal residual waste in tank S-112 (RPP-7825, Table B1.3) =	8.53E-01	Ci

Nitrate	1.96E-03	mg/L per kg
Peak nitrate groundwater concentration at fenceline for 2700 gal residual waste in tank S-112 (RPP-7825, Table B.5.4) =	3.65E+00	mg/L
Nitrate inventory in 2700 gal residual waste in tank S-112 (RPP-7825, Table B1.3) =	1.86E+03	kg

Reference

RPP-7825, 2002, *Single-Shell Tank S-112 Full Scale Saltcake Waste Retrieval Technology Demonstration Functions and Requirements*, Rev. 1, CH2M HILL Hanford Group, Inc., Richland, Washington

Health Effects Conversion Factors

Health effects conversion factors are taken from HNF-SD-WM-TI-707, which provides a comprehensive set of expsoure scenarios and health effects factors for use in Hanford tank waste performance assessments. The factors used are for exposure via the groundwater pathway.

Mobile Radionuclide Contaminant of Concern Groundwater Unit Risk Factors

Nuclide	Units	HSRAM Industrial[a]	HSRAM Residential[b]
C-14	risk per pCi/L	7.77E-09	5.61E-08
Se-79	risk per pCi/L	3.65E-08	1.88E-07
Tc-99	risk per pCi/L	1.38E-08	3.36E-07
I-129	risk per pCi/L	7.42E-07	3.84E-06

[a]Source = HNF-SD-WM-TI-707, Rev. 3, Table 22
[b]Source = HNF-SD-WM-TI-707, Rev. 3, Table 26
HSRAM = Hanford Site Risk Assessment Methodology (DOE/RL-91-45)

Mobile Noncarcinogenic Chemical Contaminant of Concern Groundwater Unit Hazard Factors

Chemical	Units	HSRAM Industrial[a]	HSRAM Residential[b]
Chromium VI	hazard index per mg/L	4.32E+00	2.40E+01
Nitrite	hazard index per mg/L	9.89E-02	6.36E-01
Nitrate	hazard index per mg/L	6.18E-03	3.98E-02

[a]Source = HNF-SD-WM-TI-707, Rev. 3, Table 23
[b]Source = HNF-SD-WM-TI-707, Rev. 3, Table 27
HSRAM = Hanford Site Risk Assessment Methodology (DOE/RL-91-45)

Carcinogenic Chemical Groundwater Unit Risk Factors

Chemical	Units	HSRAM Industrial[a]	HSRAM Residential[b]
Arsenic	cancer risk per mg/L	4.31E-01	7.25E-01
Beryllium	cancer risk per mg/L	2.37E-01	3.91E-01
Cadmium	cancer risk per mg/L	1.78E-01	2.93E-01
Cobalt	cancer risk per mg/L	2.77E-01	4.56E-01
Chromium VI	cancer risk per mg/L	2.70E-05	6.00E-05

[a]Source = HNF-SD-WM-TI-707, Rev. 3, Table 23
[b]Source = HNF-SD-WM-TI-707, Rev. 3, Table 27

Reference

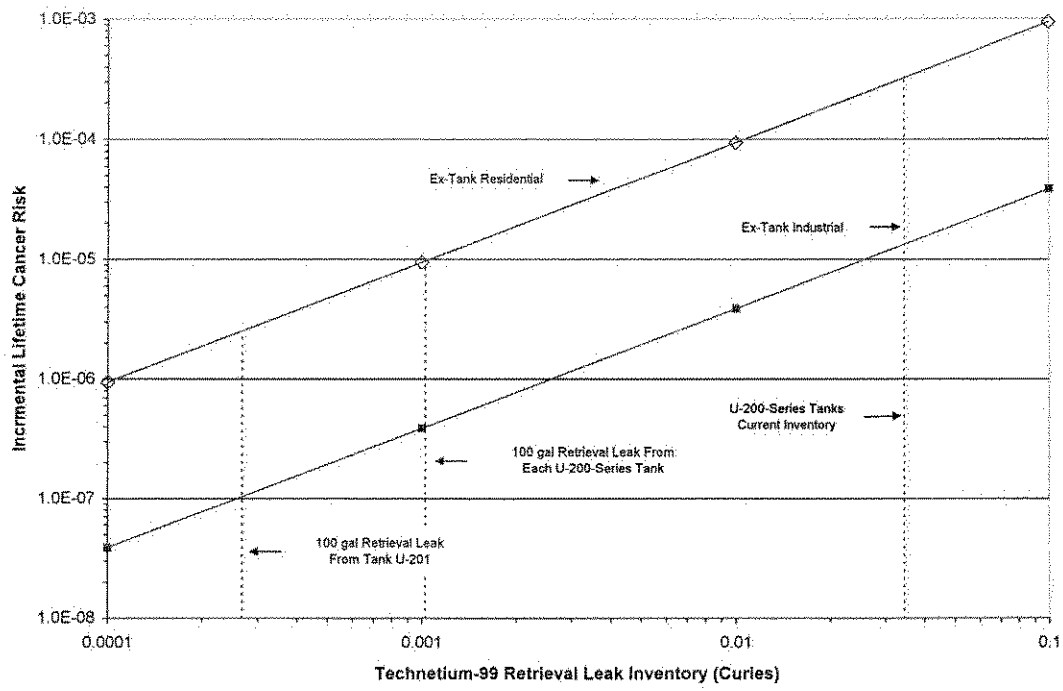
HNF-SD-WM-TI-707, 2003, *Exposure Scenarios and Unit Dose Factors for the Hanford Tank Waste Performance Assessment*, Rev. 3, U. S. Department of Energy, Richland, Washington

U-200-Series Tanks
Technetium-99 ILCR vs. Inventory Plot

Tc-99 Inventory (Ci)	ILCR (Linear extrapolation using technetium-99 ex-tank transfer function)	
	Ex-Tank Industrial	Ex-Tank Residential
0.0001	3.86E-08	9.40E-07
0.001	3.86E-07	9.40E-06
0.01	3.86E-06	9.40E-05
0.1	3.86E-05	9.40E-04

Tc-99 Inventory (Ci)	Residential (ILCR)	Industrial (ILCR)
U-200 tanks current inventory (4 tank total)		
3.45E-02	1.00E-08	
3.45E-02	3.24E-04	1.33E-05
Inventory in 100 gal retrieval leak from U-201		
2.68E-04	1.00E-08	
2.68E-04	2.52E-06	1.03E-07
Inventory in 100 gal retrieval leak from each U-200 tank (4 tank total)		
1.02E-03	1.00E-08	
1.02E-03	9.63E-06	3.96E-07

Figure 9. U-200-Series Tanks Technetium-99 Risk Plot

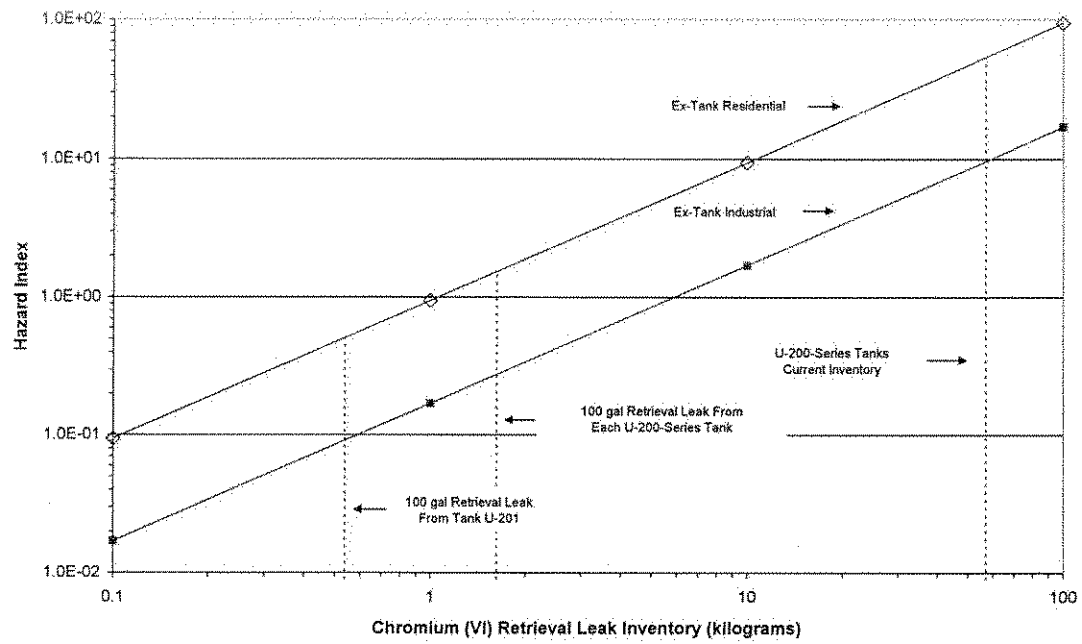


U-200-Series Tanks
Hexavalent Chromium Hazard Index vs. Inventory Plot

Chromium Inventory (kg)	Hazard Index (Linear extrapolation using chromium ex-tank transfer function)	
	Ex-Tank Industrial	Ex-Tank Residential
0.1	1.69E-02	9.38E-02
1	1.69E-01	9.38E-01
10	1.69E+00	9.38E+00
100	1.69E+01	9.38E+01

Chromium Inventory (kg)	Residential (HI)	Industrial (HI)
U-200 tanks current inventory (4 tank total)		
5.68E+01	1.00E-03	
5.68E+01	5.33E+01	9.60E+00
Inventory in 100 gal retrieval leak from U-201		
5.36E-01	1.00E-03	
5.36E-01	5.03E-01	9.06E-02
Inventory in 100 gal retrieval leak from each U-200 tank (4 tank total)		
1.62E+00	1.00E-03	
1.62E+00	1.52E+00	2.74E-01

Figure 10. U-200-Series Tanks Hexavalent Chromium Hazard Index Plot

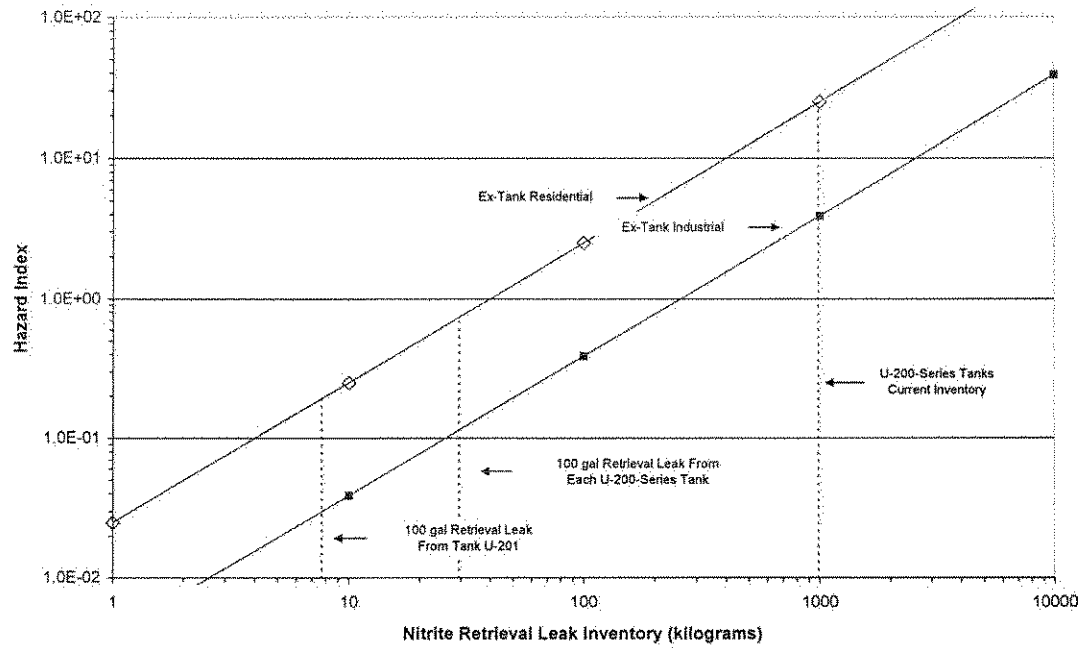


U-200-Series Tanks
Nitrite Hazard Index vs. Inventory Plot

Nitrite Inventory (kg)	Hazard Index (Linear extrapolation using nitrate ex-tank transfer function)	
	Ex-Tank Industrial	Ex-Tank Residential
1	3.87E-03	2.49E-02
10	3.87E-02	2.49E-01
100	3.87E-01	2.49E+00
1000	3.87E+00	2.49E+01
10000	3.87E+01	2.49E+02

Nitrite Inventory (kg)	Residential (HI)	Industrial (HI)
U-200 tanks current inventory (4 tank total)		
9.87E+02	1.00E-02	
9.87E+02	2.45E+01	3.82E+00
Inventory in 100 gal retrieval leak from U-201		
7.68E+00	1.00E-02	
7.68E+00	1.91E-01	2.97E-02
Inventory in 100 gal retrieval leak from each U-200 tank (4 tank total)		
2.94E+01	1.00E-02	
2.94E+01	7.30E-01	1.14E-01

Figure 11. U-200-Series Tanks Nitrite Hazard Index Plot



U Tank Farm Retrieval Leak Impacts

U tank farm retrieval leak impacts are summarized in terms of peak groundwater concentration, radiological ILCR, and noncarcinogenic chemical HI for the indicator contaminants (technetium-99, hexavalent chromium, and nitrite) identified through the screening procedure (see Contaminant Screening sheet in this workbook).

Groundwater concentrations are estimated as the product of the retrieval leak inventory (see Leak Inventory sheet in this workbook) and the ex-tank transfer function (see Transfer Functions sheet in this workbook). The ex-tank technetium-99 transfer function is used for technetium-99 and the ex-tank nitrate transfer function is used for hexavalent chromium and nitrite. The ILCR and HI values are calculated as the product of the groundwater concentration and the appropriate health effects conversion factor for the industrial and residential exposure scenarios (see Risk Factors sheet in this workbook).

Table 16. Technetium-99 Retrieval Leak Impacts at U Tank Farm Fenceline for Hypothetical Leak Volumes of 8,000 Gallons (U-100-Series Tanks) and 100 Gallons (U-200-Series Tanks)

Tank	Peak Technetium-99 Groundwater Concentration (pCi/L) (MCL = 900 pCi/L)	Incremental Lifetime Cancer Risk	
		Industrial	Residential
U-101	6.72E+02	9.27E-06	2.26E-04
U-102	2.43E+04	3.36E-04	8.18E-03
U-103	4.31E+04	5.95E-04	1.45E-02
U-104	2.35E+03	3.24E-05	7.90E-04
U-105	6.94E+04	9.58E-04	2.33E-02
U-106	5.57E+04	7.69E-04	1.87E-02
U-107	2.59E+04	3.57E-04	8.69E-03
U-108	3.27E+04	4.52E-04	1.10E-02
U-109	2.50E+04	3.46E-04	8.42E-03
U-110	7.56E+02	1.04E-05	2.54E-04
U-111	3.58E+04	4.94E-04	1.20E-02
U-112	8.40E+02	1.16E-05	2.82E-04
U-201	7.49E+00	1.03E-07	2.52E-06
U-202	7.43E+00	1.03E-07	2.50E-06
U-203	6.16E+00	8.50E-08	2.07E-06
U-204	7.59E+00	1.05E-07	2.55E-06

Table 17. Hexavalent Chromium and Nitrite Retrieval Leak Impacts at U Tank Farm Fenceline for Hypothetical Leak Volumes of 8,000 Gallons (U-100-Series Tanks) and 100 Gallons (U-200-Series Tanks)

Tank	Peak Chromium (VI) Groundwater Concentration (mg/L) (MCL = 0.05 mg/L)	Peak Nitrite Groundwater Concentration (mg/L) (MCL = 3.3 mg/L)	Hazard Index Industrial Scenario			Hazard Index Residential Scenario		
			Chromium (VI)	Nitrite	Total	Chromium (VI)	Nitrite	Total
U-101	1.74E-01	4.22E+00	7.53E-01	4.18E-01	1.17E+00	4.18E+00	2.68E+00	6.87E+00
U-102	4.69E-01	4.10E+01	2.03E+00	4.06E+00	6.09E+00	1.13E+01	2.61E+01	3.74E+01
U-103	8.44E-01	3.58E+01	3.65E+00	3.54E+00	7.19E+00	2.03E+01	2.28E+01	4.31E+01
U-104	4.89E-01	7.54E+00	2.11E+00	7.46E-01	2.86E+00	1.17E+01	4.80E+00	1.65E+01
U-105	2.10E-01	3.47E+01	9.08E-01	3.43E+00	4.34E+00	5.05E+00	2.21E+01	2.71E+01
U-106	2.06E-01	4.14E+01	8.92E-01	4.10E+00	4.99E+00	4.95E+00	2.64E+01	3.13E+01
U-107	5.00E-01	2.44E+01	2.16E+00	2.41E+00	4.57E+00	1.20E+01	1.55E+01	2.75E+01
U-108	3.23E-01	4.18E+01	1.39E+00	4.14E+00	5.53E+00	7.75E+00	2.66E+01	3.43E+01
U-109	4.50E-01	3.32E+01	1.94E+00	3.29E+00	5.23E+00	1.08E+01	2.11E+01	3.19E+01
U-110	5.39E-02	1.89E+00	2.33E-01	1.87E-01	4.20E-01	1.29E+00	1.20E+00	2.50E+00
U-111	7.78E-01	3.95E+01	3.36E+00	3.90E+00	7.26E+00	1.87E+01	2.51E+01	4.38E+01
U-112	2.81E-02	4.65E-01	1.21E-01	4.60E-02	1.67E-01	6.74E-01	2.96E-01	9.69E-01
U-201	2.10E-02	3.00E-01	9.06E-02	2.97E-02	1.20E-01	5.03E-01	1.91E-01	6.94E-01
U-202	2.08E-02	2.97E-01	8.98E-02	2.93E-02	1.19E-01	4.99E-01	1.89E-01	6.88E-01
U-203	1.73E-02	2.47E-01	7.48E-02	2.44E-02	9.92E-02	4.15E-01	1.57E-01	5.72E-01
U-204	4.32E-03	3.04E-01	1.87E-02	3.00E-02	4.87E-02	1.04E-01	1.93E-01	2.97E-01

U Tank Farm Residual Waste Impacts

U tank farm residual waste impacts are summarized in terms of peak groundwater concentration, radiological ILCR, and noncarcinogenic chemical HI for the indicator contaminants (technetium-99, hexavalent chromium, and nitrite) identified through the screening procedure (see Contaminant Screening sheet in this workbook).

Groundwater concentrations are estimated as the product of the residual waste inventory (see Residual Inventory sheet in this workbook) and the in-tank transfer function (see Transfer Functions sheet in this workbook). The in-tank technetium-99 transfer function is used for technetium-99 and the in-tank nitrate transfer function is used for hexavalent chromium and nitrite. The ILCR and HI values are calculated as the product of the groundwater concentration and the appropriate health effects conversion factor for the industrial and residential exposure scenarios (see Risk Factors sheet in this workbook).

Impacts From Residual Waste After Retrieval to HFFACO Goals

Table 18. Technetium-99 Residual Waste Impacts at U Tank Farm Fenceline After Retrieval to HFFACO Interim Retrieval Goals

Tank	Peak Technetium-99 Groundwater Concentration (pCi/L) (MCL = 900 pCi/L)	Incremental Lifetime Cancer Risk	
		Industrial	Residential
U-101	2.74E+01	3.79E-07	9.22E-06
U-102	6.92E+02	9.55E-06	2.33E-04
U-103	1.62E+02	2.24E-06	5.44E-05
U-104	3.97E+01	5.47E-07	1.33E-05
U-105	2.84E+02	3.92E-06	9.55E-05
U-106	4.90E+01	6.77E-07	1.65E-05
U-107	1.27E+03	1.75E-05	4.25E-04
U-108	5.37E+02	7.41E-06	1.80E-04
U-109	7.44E+02	1.03E-05	2.50E-04
U-110	2.96E+01	4.08E-07	9.93E-06
U-111	8.41E+02	1.16E-05	2.82E-04
U-112	2.92E+01	4.03E-07	9.81E-06
U-201	1.04E-01	1.44E-09	3.50E-08
U-202	1.03E-01	1.43E-09	3.47E-08
U-203	8.57E-02	1.18E-09	2.88E-08
U-204	1.06E-01	1.46E-09	3.55E-08

Table 19. Hexavalent Chromium and Nitrite Residual Waste Impacts at U Tank Farm Fenceline After Retrieval to HFFACO Interim Retrieval Goals

Tank	Peak Chromium (VI) Groundwater Concentration (mg/L) (MCL = 0.05 mg/L)	Peak Nitrite Groundwater Concentration (mg/L) (MCL = 3.3 mg/L)	Hazard Index Industrial Scenario			Hazard Index Residential Scenario		
			Chromium (VI)	Nitrite	Total	Chromium (VI)	Nitrite	Total
U-101	1.09E-01	1.26E+00	4.72E-01	1.24E-01	5.96E-01	2.62E+00	7.99E-01	3.42E+00
U-102	2.80E-01	3.05E-01	1.21E+00	3.01E-02	1.24E+00	6.72E+00	1.94E-01	6.91E+00
U-103	3.67E-01	2.64E-01	1.59E+00	2.61E-02	1.61E+00	8.81E+00	1.68E-01	8.98E+00
U-104	1.03E-01	8.65E-01	4.47E-01	8.56E-02	5.32E-01	2.48E+00	5.50E-01	3.03E+00
U-105	4.00E-01	2.70E-01	1.73E+00	2.67E-02	1.75E+00	9.60E+00	1.71E-01	9.77E+00
U-106	8.10E-01	2.90E-01	3.50E+00	2.87E-02	3.53E+00	1.94E+01	1.85E-01	1.96E+01
U-107	4.14E-01	1.87E-01	1.79E+00	1.85E-02	1.81E+00	9.93E+00	1.19E-01	1.00E+01
U-108	3.28E-01	3.06E-01	1.42E+00	3.02E-02	1.45E+00	7.87E+00	1.94E-01	8.07E+00
U-109	3.54E-01	2.49E-01	1.53E+00	2.47E-02	1.56E+00	8.51E+00	1.59E-01	8.66E+00
U-110	1.64E-02	3.51E-01	7.08E-02	3.47E-02	1.06E-01	3.93E-01	2.23E-01	6.17E-01
U-111	5.20E-01	2.96E-01	2.24E+00	2.93E-02	2.27E+00	1.25E+01	1.88E-01	1.27E+01
U-112	1.48E-02	1.11E-01	6.38E-02	1.10E-02	7.48E-02	3.54E-01	7.08E-02	4.25E-01
U-201	2.32E-03	3.32E-02	1.00E-02	3.28E-03	1.33E-02	5.56E-02	2.11E-02	7.67E-02
U-202	2.30E-03	6.04E-02	9.92E-03	5.98E-03	1.59E-02	5.51E-02	3.84E-02	9.35E-02
U-203	1.91E-03	2.73E-02	8.26E-03	2.70E-03	1.10E-02	4.59E-02	1.73E-02	6.32E-02
U-204	4.77E-04	3.36E-02	2.06E-03	3.32E-03	5.38E-03	1.14E-02	2.13E-02	3.28E-02

U Tank Farm Past Leak Impacts

U tank farm past leak impacts are summarized in terms of peak groundwater concentration, radiological ILCR, and noncarcinogenic chemical HI for the indicator contaminants (technetium-99, hexavalent chromium, and nitrite) identified through the screening procedure (see Contaminant Screening sheet in this workbook).

Groundwater concentrations are estimated as the product of the past leak inventory (see Leak Inventory sheet in this workbook) and the ex-tank transfer function (see Transfer Functions sheet in this workbook). The ex-tank technetium-99 transfer function is used for technetium-99 and the ex-tank nitrate transfer function is used for hexavalent chromium and nitrite. The ILCR and HI values are calculated as the product of the groundwater concentration and the appropriate health effects conversion factor for the industrial and residential exposure scenarios (see Risk Factors sheet in this workbook).

Table 20. Technetium-99 Past Leak Impacts at U Tank Farm Fenceline

Tank	Peak Technetium-99 Groundwater Concentration (pCi/L) (MCL = 900 pCi/L)	Incremental Lifetime Cancer Risk	
		Industrial	Residential
U-104	5.01E+04	6.91E-04	1.68E-02
U-110	1.74E+04	2.39E-04	5.83E-03
U-112	2.21E+04	3.05E-04	7.42E-03

Table 21. Hexavalent Chromium and Nitrite Past Leak Impacts at U Tank Farm Fenceline

Tank	Peak Chromium (VI) Groundwater Concentration (mg/L) (MCL = 0.05 mg/L)	Peak Nitrite Groundwater Concentration (mg/L) (MCL = 3.3 mg/L)	Hazard Index Industrial Scenario			Hazard Index Residential Scenario		
			Chromium (VI)	Nitrite	Total	Chromium (VI)	Nitrite	Total
U-104	6.22E-01	1.58E+01	2.68E+00	1.56E+00	4.24E+00	1.49E+01	1.00E+01	2.49E+01
U-110	9.93E-01	2.51E+01	4.29E+00	2.49E+00	6.77E+00	2.38E+01	1.60E+01	3.98E+01
U-112	6.22E+00	4.73E+01	2.68E+01	4.68E+00	3.15E+01	1.49E+02	3.01E+01	1.79E+02

Residual Waste Inventoy

U-200-Series Tanks Final Radionuclide Inventory Estimates for 30 Cubic Feet of Tank Residuals Based on Selective Phase Removal Method[a]

Nuclide	Units	Tank			
		U-201	U-202	U-203	U-204
3H	Ci	5.13E-04	5.08E-04	4.22E-04	5.20E-04
14C	Ci	8.21E-05	8.10E-05	6.73E-05	8.26E-05
60Co	Ci	1.41E-05	1.40E-05	1.16E-05	1.43E-05
59Ni	Ci	2.32E-05	2.30E-05	1.91E-05	2.36E-05
63Ni	Ci	2.07E-03	2.05E-03	1.70E-03	2.09E-03
79Se	Ci	1.78E-06	1.76E-06	1.46E-06	1.80E-06
90Sr	Ci	2.72E+00	9.79E-01	1.89E+00	1.27E+01
90Y	Ci	2.72E+00	9.79E-01	1.89E+00	1.27E+01
93mNb	Ci	8.44E-05	8.37E-05	6.93E-05	8.57E-05
93Zr	Ci	7.31E-05	7.25E-05	6.01E-05	7.42E-05
99Tc	Ci	5.89E-04	5.84E-04	4.84E-04	5.97E-04
106Ru	Ci	1.69E-12	1.67E-12	1.39E-12	1.71E-12
113mCd	Ci	1.89E-04	1.87E-04	1.55E-04	1.92E-04
125Sb	Ci	1.03E-05	1.02E-05	8.43E-06	1.04E-05
126Sn	Ci	1.09E-05	1.08E-05	8.89E-06	1.10E-05
129I	Ci	1.13E-06	1.12E-06	9.28E-07	1.14E-06
134Cs	Ci	1.18E-07	1.17E-07	9.67E-08	1.20E-07
137Cs	Ci	4.58E+01	4.54E+01	3.76E+01	4.64E+01
137mBa	Ci	4.33E+01	4.29E+01	3.55E+01	4.39E+01
151Sm	Ci	6.00E-02	5.97E-02	4.95E-02	6.10E-02
152Eu	Ci	9.18E-05	9.08E-05	7.52E-05	9.27E-05
154Eu	Ci	4.91E-04	4.86E-04	4.03E-04	4.97E-04
155Eu	Ci	2.36E-03	2.33E-03	1.93E-03	2.39E-03
226Ra	Ci	1.05E-12	8.78E-13	6.90E-13	6.11E-13
228Ra	Ci	1.22E-13	1.21E-13	1.00E-13	1.24E-13
227Ac	Ci	1.39E-08	1.37E-08	1.14E-08	1.41E-08
229Th	Ci	3.10E-11	3.07E-11	2.54E-11	3.14E-11
232Th	Ci	3.04E-14	3.01E-14	2.49E-14	3.07E-14
231Pa	Ci	8.77E-09	7.32E-09	5.75E-09	5.09E-09
232U	Ci	3.40E-09	1.44E-09	1.06E-09	1.96E-08
233U	Ci	1.19E-10	5.74E-11	4.20E-11	7.80E-10
234U	Ci	1.21E-04	3.55E-05	2.60E-05	4.81E-04
235U	Ci	5.37E-06	1.52E-06	1.10E-06	2.05E-05
236U	Ci	1.83E-06	7.84E-07	5.71E-07	1.06E-05
238U	Ci	1.24E-04	3.46E-05	2.54E-05	4.69E-04
237Np	Ci	4.11E-06	4.08E-06	3.38E-06	4.16E-06
238Pu	Ci	1.08E-05	2.95E-05	2.16E-05	1.07E-03
239Pu	Ci	7.31E-04	1.99E-03	1.46E-03	7.24E-02
240Pu	Ci	1.03E-04	2.80E-04	2.07E-04	1.02E-02
241Pu	Ci	4.49E-04	1.22E-03	9.02E-04	4.45E-02
242Pu	Ci	2.67E-09	7.25E-09	5.35E-09	2.64E-07
241Am	Ci	6.12E-06	1.67E-05	1.23E-05	6.09E-04

[a]Source = RPP-20421, Table 5-7d

Unit Dose Factors

Unit Dose Factors for Inadvertent Intruder Scenarios[a]

Nuclide	Driller (mrem per Ci/kg)	Suburban Resident (mrem/yr per Ci exhumed)	Rural Resident (mrem/yr per Ci exhumed)
	Total 10% Internal	Total 10% Internal	Total 10% Internal
H-3	3.25E+00	3.04E-01	1.33E-02
C-14	1.64E+02	6.22E+01	1.36E+00
Co-60	3.79E+07	1.20E+04	4.78E+02
Ni-59	1.09E+01	5.70E-01	3.23E-02
Ni-63	3.00E+01	1.56E+00	8.83E-02
Se-79	5.17E+02	1.00E+01	2.37E-01
Sr-90+D	8.12E+04	3.59E+03	9.73E+01
90Y	0.00E+00	0.00E+00	0.00E+00
Nb-93m	5.03E+02	5.40E-01	4.63E-03
Zr-93	1.23E+02	3.37E-01	3.96E-03
Tc-99	5.66E+02	5.06E+02	2.54E+00
Ru-106+D	3.35E+06	9.35E+02	3.56E+01
Cd-113m	1.11E+04	1.15E+03	7.61E+00
Sb-125	6.53E+06	1.90E+03	7.58E+01
Sn-126+D	3.09E+07	9.66E+03	3.86E+02
I-129	7.29E+04	2.99E+02	2.27E+01
Cs-134	2.41E+07	7.53E+03	3.00E+02
Cs-137+D	8.78E+06	3.13E+03	1.25E+02
137mBa	0.00E+00	0.00E+00	0.00E+00
Sm-151	3.85E+01	1.36E-01	1.15E-03
Eu-152	1.73E+07	5.42E+03	2.17E+02
Eu-154	1.88E+07	5.89E+03	2.36E+02
Eu-155	6.77E+05	1.60E+02	6.41E+00
Ra-226+D	2.69E+07	9.15E+03	3.61E+02
Ra-228+D	1.49E+07	5.78E+03	2.26E+02
Ac-227+D	7.47E+06	4.67E+03	1.19E+02
Th-229+D	5.61E+06	2.60E+03	8.63E+01
Th-232	6.95E+05	1.02E+03	2.89E+01
Pa-231	1.70E+06	2.31E+03	4.42E+01
U-232	7.60E+04	1.33E+03	3.15E+01
U-233	2.28E+04	1.48E+02	1.24E+00
U-234	1.96E+04	1.44E+02	1.17E+00
U-235+D	2.42E+06	7.99E+02	2.76E+01
U-236	1.80E+04	1.37E+02	1.11E+00
U-238+D	3.77E+05	2.40E+02	5.25E+00
Np-237+D	3.76E+06	4.29E+03	5.31E+01
Pu-238	3.51E+05	6.34E+02	1.10E+01
Pu-239	3.86E+05	7.02E+02	1.21E+01
Pu-240	3.86E+05	7.02E+02	1.21E+01
Pu-241+D	7.48E+03	1.38E+01	2.38E-01
Pu-242	3.68E+05	6.68E+02	1.16E+01
Am-241	5.83E+05	7.60E+02	1.41E+01

[a]Source = HNF-SD-WM-TI-707, Tables 7, 8, and 10 (Internal Doses Reduced by 90% Because of Waste Form)

Analyte	Name	Half Life	Half Life Units
3H	Tritium	12	yr
14C	Carbon-14	5730	yr
60Co	Cobalt-60	5	yr
59Ni	Nickel-59	76000	yr
63Ni	Nickel-63	100	yr
79Se	Selenium-79	650000	yr
90Sr	Strontium-90 + Daughters	29	yr
90Y	Yttrium-90	0.007306	yr
93mNb	Niobium-93m	16	yr
93Zr	Zirconium-93	1530000	yr
99Tc	Technetium-99	211100	yr
106Ru	Ruthenium-106	1	yr
113mCd	Cadmium-113m	14	yr
125Sb	Antimony-125	3	yr
126Sn	Tin-126 + Daughters	100000	yr
129I	Iodine-129	15700000	yr
134Cs	Cesium-134	2	yr
137Cs	Cesium-137 + Daughters	30	yr
137mBa	Barium-137m	0.00000486	yr
151Sm	Samarium-151	90	yr
152Eu	Europium-152	14	yr
154Eu	Europium-154	9	yr
155Eu	Europium-155	5	yr
226Ra	Radium-226 +D	1600	yr
228Ra	Radium-228 +D	6	yr
227Ac	Actinium-227 + Daughters	21.8	yr
229Th	Thorium-229 + Daughters	7340	yr
232Th	Thorium-232	14100000000	yr
231Pa	Protactinium-231	32760	yr
232U	Uranium-232	70	yr
233U	Uranium-233	159200	yr
234U	Uranium-234	245500	yr
235U	Uranium-235	703800000	yr
236U	Uranium-236	23420000	yr
238U	Uranium-238 +D	4468000000	yr
237Np	Neptunium-237 +D	2144000	yr
238Pu	Plutonium-238	88	yr
239Pu	Plutonium-239	24110	yr
240Pu	Plutonium-240	6564	yr
241Pu	Plutonium-241 +D	14	yr
242Pu	Plutonium-242	373300	yr
241Am	Americium-241	432	yr
243Am	Americium-243 +D	7370	yr
242Cm	Curium-242	0.443835616	yr
243Cm	Curium-243	29	yr
244Cm	Curium-244	18	yr

Driller Scenario Calculation

Tank Series	C-100	Tank Series	C-200	Borehole Length (m):	67
Tank Diameter (ft)	75	Tank Diameter (ft)	20	Volume Exhumed (m^3):	3.39494011
Borehole Diameter (in)	10	Borehole Diameter (in)	10	Density of Soils (kg/m^3)	2000
(Borehole Radius)/(Tank Radius) Ratio	1.23E-04	(Borehole Radius)/(Tank Radius) Ratio	1.74E-03	Mass Exhumed	6789.88022
Waste Form Factor (not used done on dose factor page), however used in formula keep value 1	1	Waste Form Factor (not used done on dose factor page), however used in formula keep value 1	1		

Tank Name/ Inventory	Radionuclide	Inventory (Ci)	Half-Life (Years)	Unit Dose Factor (mrem per Ci/kg)	Exhumed Concentration (Ci/kg)	Driller --> Dose at Year (mrem)										
						0	100	200	300	400	500	600	700	800	900	1000
U-201/SPR	3H	5.13E-04	12	3.25E+00	1.31E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	14C	8.21E-05	5730	1.84E+02	2.10E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	60Co	1.41E-05	5	3.79E+07	3.61E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	59Ni	2.32E-05	7.600E+04	1.09E+01	5.93E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	63Ni	2.07E-03	100	3.00E+01	5.29E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	79Se	1.78E-06	6.500E+05	5.17E+02	4.55E-13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	90Sr	2.72E+00	29	6.12E+04	6.95E-07	0.056	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	90Y	2.72E+00	0.007306	0.00E+00	6.95E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	93mNb	8.44E-05	16	5.03E+02	2.16E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	93Zr	7.31E-05	1.530E+06	1.23E+02	1.87E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	99Tc	5.89E-04	2.111E+05	5.66E+02	1.51E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	106Ru	1.69E-12	1	3.35E+06	4.32E-19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	113mCd	1.89E-04	14	1.11E+04	4.83E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	125Sb	1.03E-05	3	6.53E+06	2.63E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	126Sn	1.09E-05	1.000E+05	3.09E+07	2.79E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	129I	1.13E-06	1.570E+07	7.29E+04	2.89E-13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	134Cs	1.18E-07	2	2.41E+07	3.02E-14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	137Cs	4.58E+01	30	6.78E+06	1.17E-05	102.849	10.204	1.012	0.100	0.010	0.001	0.000	0.000	0.000	0.000	0.000
U-201/SPR	137mBa	4.33E+01	4.860E-06	0.00E+00	1.11E-05	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	151Sm	6.00E-02	90	3.85E+01	1.53E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	152Eu	9.18E-05	14	1.73E+07	2.35E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	154Eu	4.91E-04	9	1.88E+07	1.26E-10	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	155Eu	2.36E-03	5	6.77E+05	6.03E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	226Ra	1.05E-12	1600	2.69E+07	2.68E-19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	228Ra	1.22E-13	6	1.49E+07	3.12E-20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	227Ac	1.39E-08	21.8	7.47E+06	3.55E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	229Th	3.10E-11	7340	5.61E+06	7.93E-18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	232Th	3.04E-14	1.410E+10	6.95E+05	7.77E-21	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	231Pa	8.77E-09	32760	1.70E+06	2.24E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	232U	3.40E-09	70	7.60E+04	8.69E-16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	233U	1.19E-10	1.592E+05	2.28E+04	3.04E-17	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	234U	1.21E-04	2.455E+05	1.96E+04	3.09E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	235U	5.37E-08	7.038E+08	2.42E+08	1.37E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	236U	1.83E-06	2.342E+07	1.80E+04	4.68E-13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	238U	1.24E-04	4.468E+09	3.77E+05	3.17E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	237Np	4.11E-06	2.144E+06	3.78E+06	1.05E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	238Pu	1.08E-05	88	3.51E+05	2.76E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	239Pu	7.31E-04	2.411E+04	3.86E+05	1.87E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	240Pu	1.03E-04	6564	3.86E+05	2.63E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	241Pu	4.49E-04	14	7.48E+03	1.15E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	242Pu	2.67E-09	3.733E+05	3.68E+05	6.83E-16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	241Am	6.12E-06	432	5.83E+05	1.56E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	243Am	1.70E-12	7370	3.33E+06	4.35E-19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	242Cm	1.60E-09	0.443835616	1.48E+04	4.09E-16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	243Cm	3.19E-11	29	2.09E+06	8.16E-18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	244Cm	4.54E-11	18	2.22E+05	1.16E-17	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201 Total						**102.909**	**10.209**	**1.013**	**0.101**	**0.010**	**1.18E-03**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**

Tank Name/ Inventory	Radionuclide	Inventory (Ci)	Half-Life (Years)	Unit Dose Factor (mrem per Ci/kg)	Exhumed Concentration (Ci/kg)	Driller --> Dose at Year (mrem)										
						0	100	200	300	400	500	600	700	800	900	1000
U-202/SPR	3H	5.08E-04	12	3.25E+00	1.30E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	14C	8.10E-05	5730	1.64E+02	2.07E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	60Co	1.40E-05	5	3.79E+07	3.58E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	59Ni	2.30E-05	7.600E+04	1.09E+01	5.88E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	63Ni	2.05E-03	100	3.00E+01	5.24E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	79Se	1.76E-06	6.500E+05	5.17E+02	4.50E-13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	90Sr	9.79E-01	29	6.12E+04	2.50E-07	0.020	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	90Y	9.79E-01	0.007306	0.00E+00	2.50E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	93mNb	6.37E-05	16	5.03E+02	2.14E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	93Zr	7.25E-05	1.530E+06	1.23E+02	1.85E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	99Tc	5.84E-04	2.111E+05	5.66E+02	1.49E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	106Ru	1.67E-12	1	3.35E+06	4.27E-19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	113mCd	1.87E-04	14	1.11E+04	4.78E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	125Sb	1.02E-05	3	6.53E+06	2.61E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	126Sn	1.08E-05	1.000E+05	3.09E+07	2.76E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	129I	1.12E-06	1.570E+07	7.29E+04	2.86E-13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	134Cs	1.17E-07	2	2.41E+07	2.99E-14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	137Cs	4.54E+01	30	8.78E+06	1.16E-05	101.951	10.115	1.004	0.100	0.010	0.001	0.000	0.000	0.000	0.000	0.000
U-202/SPR	137mBa	4.29E+01	4.860E-06	0.00E+00	1.10E-05	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	151Sm	5.97E-02	90	3.85E+01	1.53E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	152Eu	9.08E-05	14	1.73E+07	2.32E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	154Eu	4.86E-04	9	1.88E+07	1.24E-10	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	155Eu	2.33E-03	5	6.77E+05	5.96E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	226Ra	8.78E-13	1600	2.69E+07	2.24E-19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	228Ra	1.21E-13	6	1.49E+07	3.09E-20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	227Ac	1.37E-08	21.8	7.47E+06	3.50E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	229Th	3.07E-11	7340	5.61E+06	7.85E-18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	232Th	3.01E-14	1.410E+10	6.95E+05	7.70E-21	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	231Pa	7.32E-09	32760	1.70E+06	1.87E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	232U	1.44E-09	70	7.60E+04	3.68E-16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	233U	5.74E-11	1.592E+05	2.28E+04	1.47E-17	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	234U	3.55E-05	2.455E+05	1.96E+04	9.08E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	235U	1.52E-06	7.038E+08	2.42E+06	3.89E-13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	236U	7.84E-07	2.342E+07	1.80E+04	2.00E-13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	238U	3.46E-05	4.468E+09	3.77E+05	8.85E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	237Np	4.08E-06	2.144E+06	3.76E+06	1.04E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	238Pu	2.95E-05	88	3.51E+05	7.54E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	239Pu	1.99E-03	2.411E+04	3.86E+05	5.09E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	240Pu	2.80E-04	6564	3.86E+05	7.16E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	241Pu	1.22E-03	14	7.48E+03	3.12E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	242Pu	7.25E-09	3.733E+05	3.68E+05	1.85E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	241Am	1.67E-05	432	5.83E+05	4.27E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	243Am	4.62E-12	7370	3.33E+06	1.16E-18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	242Cm	4.38E-09	0.443835616	1.48E+04	1.12E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	243Cm	8.89E-11	29	2.09E+06	2.22E-17	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	244Cm	1.23E-10	18	2.22E+05	3.14E-17	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202 Total						101.975	10.117	1.004	0.100	0.010	1.29E-03	0.000	0.000	0.000	0.000	0.000

Tank Name/ Inventory	Radionuclide	Inventory	Half-Life	Unit Dose Factor	Exhumed Concentration	Driller --> Dose at Year (mrem)										
		(Ci)	(Years)	(mrem per Ci/kg)	(Ci/kg)	0	100	200	300	400	500	600	700	800	900	1000
U-203/SPR	3H	4.22E-04	12	3.25E+00	1.06E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	14C	6.73E-05	5730	1.64E+02	1.72E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	60Co	1.16E-05	5	3.79E+07	2.97E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	59Ni	1.91E-05	7.600E+04	1.09E+01	4.88E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	63Ni	1.70E-03	100	3.00E+01	4.35E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	79Se	1.46E-06	6.500E+05	5.17E+02	3.73E-13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	90Sr	1.89E+00	29	6.12E+04	4.83E-07	0.039	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	90Y	1.89E+00	0.007306	0.00E+00	4.83E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	93mNb	6.93E-05	16	5.03E+02	1.77E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	93Zr	6.01E-05	1.530E+06	1.23E+02	1.54E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	99Tc	4.84E-04	2.111E+05	5.66E+02	1.24E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	106Ru	1.39E-12	1	3.35E+06	3.55E-19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	113mCd	1.55E-04	14	1.11E+04	3.96E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	125Sb	8.43E-06	3	6.53E+06	2.16E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	126Sn	8.89E-06	1.000E+05	3.09E+07	2.27E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	129I	9.26E-07	1.570E+07	7.29E+04	2.37E-13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	134Cs	9.67E-08	2	2.41E+07	2.47E-14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	137Cs	3.76E+01	30	8.78E+06	9.61E-06	84.435	8.377	0.831	0.082	0.008	0.001	0.000	0.000	0.000	0.000	0.000
U-203/SPR	137mBa	3.55E+01	4.860E-06	0.00E+00	9.08E-06	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	151Sm	4.95E-02	90	3.85E+01	1.27E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	152Eu	7.52E-05	14	1.73E+07	1.92E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	154Eu	4.03E-04	9	1.88E+07	1.03E-10	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	155Eu	1.93E-03	5	6.77E+05	4.93E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	226Ra	6.90E-13	1600	2.69E+07	1.76E-19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	228Ra	1.00E-13	6	1.49E+07	2.56E-20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	227Ac	1.14E-08	21.8	7.47E+06	2.91E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	229Th	2.54E-11	7340	5.61E+06	6.49E-18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	232Th	2.49E-14	1.410E+10	6.95E+05	6.37E-21	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	231Pa	5.75E-09	32760	1.70E+06	1.47E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	232U	1.06E-09	70	7.80E+04	2.71E-16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	233U	4.20E-11	1.592E+05	2.28E+04	1.07E-17	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	234U	2.60E-05	2.455E+05	1.96E+04	6.65E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	235U	1.10E-06	7.038E+08	2.42E+06	2.81E-13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	236U	5.71E-07	2.342E+07	1.80E+04	1.46E-13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	238U	2.54E-05	4.468E+09	3.77E+05	6.49E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	237Np	3.38E-06	2.144E+06	3.76E+06	8.64E-13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	238Pu	2.16E-05	88	3.51E+05	5.52E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	239Pu	1.46E-03	2.411E+04	3.86E+05	3.73E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	240Pu	2.07E-04	6564	3.86E+05	5.29E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	241Pu	9.02E-04	14	7.46E+03	2.31E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	242Pu	5.35E-09	3.733E+05	3.68E+05	1.37E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	241Am	1.23E-05	432	5.83E+05	3.14E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	243Am	3.39E-12	7370	3.33E+06	8.67E-19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	242Cm	3.22E-09	0.443835616	1.48E+04	8.23E-16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	243Cm	6.40E-11	29	2.09E+06	1.64E-17	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	244Cm	9.02E-11	18	2.22E+05	2.31E-17	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203 Total						84.477	8.381	0.832	0.083	0.008	1.05E-03	0.000	0.000	0.000	0.000	0.000

Tank Name/ Inventory	Radionuclide	Inventory (Ci)	Half-Life (Years)	Unit Dose Factor (mrem per Ci/kg)	Exhumed Concentration (Ci/kg)	Driller --> Dose at Year (mrem)										
						0	100	200	300	400	500	600	700	800	900	1000
U-204/SPR	3H	5.20E-04	12	3.25E+00	1.33E-10	0.000	0.000	0.000	0.000	0.000	1.24E-22	0.000	0.000	0.000	0.000	0.000
U-204/SPR	14C	6.26E-05	5730	1.64E+02	2.11E-11	0.000	0.000	0.000	0.000	0.000	3.25E-09	0.000	0.000	0.000	0.000	0.000
U-204/SPR	60Co	1.43E-05	5	3.79E+07	3.88E-12	0.000	0.000	0.000	0.000	0.000	1.09E-34	0.000	0.000	0.000	0.000	0.000
U-204/SPR	59Ni	2.36E-05	7.600E+04	1.09E+01	6.03E-12	0.000	0.000	0.000	0.000	0.000	6.55E-11	0.000	0.000	0.000	0.000	0.000
U-204/SPR	63Ni	2.09E-03	100	3.00E+01	5.34E-10	0.000	0.000	0.000	0.000	0.000	5.01E-10	0.000	0.000	0.000	0.000	0.000
U-204/SPR	79Se	1.80E-06	6.500E+05	5.17E+02	4.60E-13	0.000	0.000	0.000	0.000	0.000	2.38E-10	0.000	0.000	0.000	0.000	0.000
U-204/SPR	90Sr	1.27E+01	29	8.12E+04	3.25E-06	0.264	0.024	0.002	0.000	0.000	1.70E-06	0.000	0.000	0.000	0.000	0.000
U-204/SPR	90Y	1.27E+01	0.007306	0.00E+00	3.25E-06	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000
U-204/SPR	93mNb	8.57E-05	16	5.03E+02	2.19E-11	0.000	0.000	0.000	0.000	0.000	4.31E-18	0.000	0.000	0.000	0.000	0.000
U-204/SPR	93Zr	7.42E-05	1.530E+06	1.23E+02	1.90E-11	0.000	0.000	0.000	0.000	0.000	2.33E-09	0.000	0.000	0.000	0.000	0.000
U-204/SPR	99Tc	5.97E-04	2.111E+05	5.66E+02	1.53E-10	0.000	0.000	0.000	0.000	0.000	8.63E-08	0.000	0.000	0.000	0.000	0.000
U-204/SPR	106Ru	1.71E-12	1	3.35E+06	4.37E-19	0.000	0.000	0.000	0.000	0.000	4.48E-163	0.000	0.000	0.000	0.000	0.000
U-204/SPR	113mCd	1.92E-04	14	1.11E+04	4.91E-11	0.000	0.000	0.000	0.000	0.000	9.67E-16	0.000	0.000	0.000	0.000	0.000
U-204/SPR	125Sb	1.04E-05	3	6.53E+06	2.66E-12	0.000	0.000	0.000	0.000	0.000	1.17E-55	0.000	0.000	0.000	0.000	0.000
U-204/SPR	126Sn	1.10E-05	1.000E+05	3.09E+07	2.81E-12	0.000	0.000	0.000	0.000	0.000	8.66E-05	0.000	0.000	0.000	0.000	0.000
U-204/SPR	129I	1.14E-06	1.570E+07	7.29E+04	2.91E-13	0.000	0.000	0.000	0.000	0.000	2.12E-08	0.000	0.000	0.000	0.000	0.000
U-204/SPR	134Cs	1.20E-07	2	2.41E+07	3.07E-14	0.000	0.000	0.000	0.000	0.000	4.09E-82	0.000	0.000	0.000	0.000	0.000
U-204/SPR	137Cs	4.64E+01	30	8.78E+06	1.19E-05	104.196	10.336	1.026	0.102	0.010	1.00E-03	0.000	0.000	0.000	0.000	0.000
U-204/SPR	137mBa	4.39E+01	4.860E-06	0.00E+00	1.12E-05	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000
U-204/SPR	151Sm	6.10E-02	90	3.85E+01	1.56E-08	0.000	0.000	0.000	0.000	0.000	1.28E-08	0.000	0.000	0.000	0.000	0.000
U-204/SPR	152Eu	9.27E-05	14	1.73E+07	2.37E-11	0.000	0.000	0.000	0.000	0.000	7.27E-15	0.000	0.000	0.000	0.000	0.000
U-204/SPR	154Eu	4.97E-04	9	1.88E+07	1.27E-10	0.002	0.000	0.000	0.000	0.000	4.51E-20	0.000	0.000	0.000	0.000	0.000
U-204/SPR	155Eu	2.39E-03	5	6.77E+05	6.11E-10	0.000	0.000	0.000	0.000	0.000	3.26E-34	0.000	0.000	0.000	0.000	0.000
U-204/SPR	226Ra	6.11E-13	1600	2.69E+07	1.56E-19	0.000	0.000	0.000	0.000	0.000	3.38E-12	0.000	0.000	0.000	0.000	0.000
U-204/SPR	228Ra	1.24E-13	6	1.49E+07	3.17E-20	0.000	0.000	0.000	0.000	0.000	3.87E-38	0.000	0.000	0.000	0.000	0.000
U-204/SPR	227Ac	1.41E-06	21.8	7.47E+06	3.61E-15	0.000	0.000	0.000	0.000	0.000	3.38E-15	0.000	0.000	0.000	0.000	0.000
U-204/SPR	229Th	3.14E-11	7340	5.61E+06	6.03E-18	0.000	0.000	0.000	0.000	0.000	4.30E-11	0.000	0.000	0.000	0.000	0.000
U-204/SPR	232Th	3.07E-14	1.410E+10	6.95E+05	7.85E-21	0.000	0.000	0.000	0.000	0.000	5.46E-15	0.000	0.000	0.000	0.000	0.000
U-204/SPR	231Pa	5.09E-09	32760	1.70E+06	1.30E-15	0.000	0.000	0.000	0.000	0.000	2.19E-09	0.000	0.000	0.000	0.000	0.000
U-204/SPR	232U	1.96E-08	70	7.60E+04	5.01E-15	0.000	0.000	0.000	0.000	0.000	2.70E-12	0.000	0.000	0.000	0.000	0.000
U-204/SPR	233U	7.80E-10	1.592E+05	2.28E+04	1.99E-16	0.000	0.000	0.000	0.000	0.000	4.54E-12	0.000	0.000	0.000	0.000	0.000
U-204/SPR	234U	4.81E-04	2.455E+05	1.96E+04	1.23E-10	0.000	0.000	0.000	0.000	0.000	2.40E-06	0.000	0.000	0.000	0.000	0.000
U-204/SPR	235U	2.05E-05	7.038E+08	2.42E+06	5.24E-12	0.000	0.000	0.000	0.000	0.000	1.27E-05	0.000	0.000	0.000	0.000	0.000
U-204/SPR	236U	1.06E-05	2.342E+07	1.80E+04	2.71E-12	0.000	0.000	0.000	0.000	0.000	4.87E-08	0.000	0.000	0.000	0.000	0.000
U-204/SPR	238U	4.69E-04	4.468E+09	3.77E+05	1.20E-10	0.000	0.000	0.000	0.000	0.000	4.52E-05	0.000	0.000	0.000	0.000	0.000
U-204/SPR	237Np	4.16E-06	2.144E+06	3.76E+06	1.06E-12	0.000	0.000	0.000	0.000	0.000	4.00E-06	0.000	0.000	0.000	0.000	0.000
U-204/SPR	238Pu	1.07E-03	88	3.51E+05	2.74E-10	0.000	0.000	0.000	0.000	0.000	1.87E-06	0.000	0.000	0.000	0.000	0.000
U-204/SPR	239Pu	7.24E-02	2.411E+04	3.86E+05	1.85E-08	0.007	0.007	0.007	0.007	0.007	7.04E-03	0.007	0.007	0.007	0.007	0.007
U-204/SPR	240Pu	1.02E-02	6564	3.86E+05	2.61E-09	0.001	0.001	0.001	0.001	0.001	9.54E-04	0.001	0.001	0.001	0.001	0.001
U-204/SPR	241Pu	4.45E-02	14	7.48E+03	1.14E-08	0.000	0.000	0.000	0.000	0.000	1.51E-15	0.000	0.000	0.000	0.000	0.000
U-204/SPR	242Pu	2.64E-07	3.733E+05	3.68E+05	6.75E-14	0.000	0.000	0.000	0.000	0.000	2.48E-08	0.000	0.000	0.000	0.000	0.000
U-204/SPR	241Am	6.09E-04	432	5.83E+05	1.56E-10	0.000	0.000	0.000	0.000	0.000	4.07E-05	0.000	0.000	0.000	0.000	0.000
U-204/SPR	243Am	1.66E-10	7370	3.33E+08	4.30E-17	0.000	0.000	0.000	0.000	0.000	1.37E-10	0.000	0.000	0.000	0.000	0.000
U-204/SPR	242Cm	1.58E-07	0.443835616	1.48E+04	4.04E-14	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000
U-204/SPR	243Cm	3.17E-09	29	2.09E+06	8.11E-16	0.000	0.000	0.000	0.000	0.000	1.10E-14	0.000	0.000	0.000	0.000	0.000
U-204/SPR	244Cm	4.47E-09	18	2.22E+05	1.14E-15	0.000	0.000	0.000	0.000	0.000	1.10E-18	0.000	0.000	0.000	0.000	0.000
U-204 Total						104.472	10.370	1.036	0.110	0.018	9.19E-03	0.008	0.008	0.008	0.008	0.008

Suburban Resident Scenario Calculation

Tank Series	C-100	Tank Series	C-200
Tank Diameter (ft)	75	Tank Diameter (ft)	20
Borehole Diameter (in)	10	Borehole Diameter (in)	10
(Borehole Radius)/(Tank Radius) Ratio	1.235E-04	(Borehole Radius)/(Tank Radius) Ratio	1.74E-03
Waste Form Factor (not used done on dose factor page), however used in formula keep value 1	1	Waste Form Factor (not used done on dose factor page), however used in formula keep value 1	1

Tank Name/ Inventory	Radionuclide	Inventory	Half-Life	Unit Dose Factor	Exhumed Inventory	Suburban Resident with Vegetable Garden --> Dose at Year (mrem)										
		(Ci)	(Years)	(per Curie)	(Ci)	0	100	200	300	400	500	600	700	800	900	1000
U-201/SPR	3H	5.13E-04	12	3.04E-01	8.91E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	14C	8.21E-05	5730	6.22E+01	1.43E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	60Co	1.41E-05	5	1.20E+04	2.45E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	59Ni	2.32E-05	7.600E+04	5.70E-01	4.03E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	63Ni	2.07E-03	100	1.56E+00	3.59E-06	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	79Se	1.78E-06	6.500E+05	1.00E+01	3.09E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	90Sr	2.72E+00	29	3.59E+03	4.72E-03	16.957	1.554	0.142	0.013	0.001	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	90Y	2.72E+00	0.007306	0.00E+00	4.72E-03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	93mNb	8.44E-05	16	5.40E-01	1.47E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	93Zr	7.31E-05	1.530E+06	3.37E-01	1.27E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	99Tc	5.89E-04	2.111E+05	5.06E+02	1.02E-06	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
U-201/SPR	106Ru	1.68E-12	1	9.35E+02	2.93E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	113mCd	1.89E-04	14	1.15E+03	3.28E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	125Sb	1.03E-05	3	1.90E+03	1.79E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	126Sn	1.09E-05	1.000E+05	9.86E+03	1.89E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	129I	1.13E-08	1.570E+07	2.99E+02	1.96E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	134Cs	1.18E-07	2	7.53E+03	2.05E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	137Cs	4.58E+01	30	3.13E+03	7.95E-02	248.799	24.684	2.449	0.243	0.024	0.002	0.000	0.000	0.000	0.000	0.000
U-201/SPR	137mBa	4.33E+01	4.860E-06	0.00E+00	7.52E-02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	151Sm	6.00E-02	90	1.36E-01	1.04E-04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	152Eu	9.18E-05	14	5.42E+03	1.59E-07	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	154Eu	4.91E-04	9	5.89E+03	8.52E-07	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	155Eu	2.36E-03	5	1.60E+02	4.10E-06	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	226Ra	1.05E-12	1600	9.15E+03	1.82E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	228Ra	1.22E-13	6	5.78E+03	2.12E-16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	227Ac	1.39E-06	21.8	4.67E+03	2.41E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	229Th	3.10E-11	7340	2.80E+03	5.38E-14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	232Th	3.04E-14	1.410E+10	1.02E+03	5.28E-17	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	231Pa	8.77E-09	32760	2.31E+03	1.52E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	232U	3.40E-09	70	1.33E+03	5.90E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	233U	1.19E-10	1.592E+05	1.48E+02	2.07E-13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	234U	1.21E-04	2.455E+05	1.44E+02	2.10E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	235U	5.37E-08	7.038E+08	7.89E+02	9.32E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	236U	1.83E-08	2.342E+07	1.37E+02	3.18E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	238U	1.24E-04	4.468E+09	2.40E+02	2.15E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	237Np	4.11E-08	2.144E+06	4.29E+03	7.14E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	238Pu	1.08E-05	88	6.34E+02	1.86E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	239Pu	7.31E-04	2.411E+04	7.02E+02	1.27E-06	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
U-201/SPR	240Pu	1.03E-04	6564	7.02E+02	1.79E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	241Pu	4.49E-04	14	1.38E+01	7.80E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	242Pu	2.67E-09	3.733E+05	6.68E+02	4.64E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	241Am	6.12E-06	432	7.60E+02	1.06E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	243Am	1.70E-12	7370	1.51E+03	2.95E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	242Cm	1.60E-09	0.443835616	1.44E+01	2.78E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	243Cm	3.19E-11	29	9.98E+02	5.54E-14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	244Cm	4.54E-11	18	3.89E+02	7.88E-14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201 Total						**265.766**	**26.239**	**2.593**	**0.258**	**0.027**	**4.33E-03**	**0.002**	**0.002**	**0.002**	**0.002**	**0.002**

Tank Name /Inventory	Radionuclide	Inventory (Ci)	Half-Life (Years)	Unit Dose Factor (per Curie)	Exhumed Inventory Ci	Suburban Resident with Vegetable Garden --> Dose at Year (mrem)										
						0	100	200	300	400	500	600	700	800	900	1000
U-202/SPR	3H	5.08E-04	12	3.04E-01	8.62E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	14C	8.10E-05	5730	6.22E+01	1.41E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	60Co	1.40E-05	5	1.20E+04	2.43E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	59Ni	2.30E-05	7.600E+04	5.70E-01	3.99E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	63Ni	2.05E-03	100	1.56E+00	3.56E-06	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	79Se	1.76E-06	6.500E+05	1.00E+01	3.06E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	90Sr	9.79E-01	28	3.59E+03	1.70E-03	6.103	0.559	0.051	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	90Y	9.79E-01	0.007306	0.00E+00	1.70E-03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	93mNb	8.37E-05	16	5.40E-01	1.45E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	93Zr	7.25E-05	1.530E+06	3.37E-01	1.26E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	99Tc	5.84E-04	2.111E+05	5.06E+02	1.01E-06	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
U-202/SPR	106Ru	1.67E-12	1	9.35E+02	2.90E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	113mCd	1.67E-04	14	1.15E+03	3.25E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	125Sb	1.02E-05	3	1.90E+03	1.77E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	126Sn	1.08E-05	1.000E+05	9.66E+03	1.88E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	129I	1.12E-06	1.570E+07	2.99E+02	1.94E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	134Cs	1.17E-07	2	7.53E+03	2.03E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	137Cs	4.54E+01	30	3.13E+03	7.88E-02	246.626	24.468	2.428	0.241	0.024	0.002	0.000	0.000	0.000	0.000	0.000
U-202/SPR	137mBa	4.29E+01	4.860E-06	0.00E+00	7.45E-02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	151Sm	5.97E-02	90	1.36E-01	1.04E-04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	152Eu	9.08E-06	14	5.42E+03	1.58E-07	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	154Eu	4.86E-04	9	5.89E+03	8.44E-07	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	155Eu	2.33E-03	5	1.60E+02	4.05E-06	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	226Ra	8.78E-13	1600	9.15E+03	1.52E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	228Ra	1.21E-13	6	5.78E+03	2.10E-16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	227Ac	1.37E-08	21.8	4.67E+03	2.38E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	229Th	3.07E-11	7340	2.60E+03	5.33E-14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	232Th	3.01E-14	1.410E+10	1.02E+03	5.23E-17	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	231Pa	7.32E-09	32760	2.31E+03	1.27E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	232U	1.44E-09	70	1.33E+03	2.50E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	233U	5.74E-11	1.592E+05	1.48E+02	9.97E-14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	234U	3.55E-05	2.455E+05	1.44E+02	6.16E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	235U	1.52E-06	7.038E+08	7.99E+02	2.64E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	236U	7.84E-07	2.342E+07	1.37E+02	1.36E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	238U	3.46E-05	4.468E+09	2.40E+02	6.01E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	237Np	4.08E-06	2.144E+06	4.29E+03	7.08E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	238Pu	2.95E-05	88	6.34E+02	5.12E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	239Pu	1.99E-03	2.411E+04	7.02E+02	3.45E-06	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
U-202/SPR	240Pu	2.80E-04	6564	7.02E+02	4.86E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	241Pu	1.22E-03	14	1.38E+01	2.12E-06	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	242Pu	7.25E-09	3.733E+05	6.68E+02	1.26E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	241Am	1.67E-05	432	7.60E+02	2.90E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	243Am	4.62E-12	7370	1.51E+03	8.02E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	242Cm	4.38E-09	0.443835616	1.44E+01	7.60E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	243Cm	8.89E-11	29	9.88E+02	1.51E-13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	244Cm	1.23E-10	18	3.89E+02	2.14E-13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202 Total						**252.740**	**25.031**	**2.482**	**0.249**	**0.028**	**5.89E-03**	**0.004**	**0.003**	**0.003**	**0.003**	**0.003**

Tank Name /Inventory	Radionuclide	Inventory	Half-Life	Unit Dose Factor	Exhumed Inventory	Suburban Resident with Vegetable Garden --> Dose at Year (mrem)										
		(Ci)	(Years)	(per Curie)	Ci	0	100	200	300	400	500	600	700	800	900	1000
U-203/SPR	3H	4.22E-04	12	3.04E-01	7.33E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	14C	8.73E-05	5730	6.22E+01	1.17E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	60Co	1.18E-05	5	1.20E+04	2.01E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	59Ni	1.91E-05	7.600E+04	5.70E-01	3.32E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	63Ni	1.70E-03	100	1.56E+00	2.95E-06	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	79Se	1.46E-06	6.500E+05	1.00E+01	2.53E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	90Sr	1.89E+00	29	3.59E+03	3.28E-03	11.783	1.079	0.099	0.009	0.001	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	90Y	1.89E+00	0.007306	0.00E+00	3.28E-03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	93mNb	6.93E-05	16	5.40E-01	1.20E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	93Zr	6.01E-05	1.530E+06	3.37E-01	1.04E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	99Tc	4.84E-04	2.111E+05	5.08E+02	8.40E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	106Ru	1.39E-12	1	9.35E+02	2.41E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	113mCd	1.55E-04	14	1.15E+03	2.69E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	125Sb	8.43E-08	3	1.90E+03	1.46E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	126Sn	8.89E-06	1.000E+05	9.66E+03	1.54E-06	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	129I	9.28E-07	1.570E+07	2.99E+02	1.61E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	134Cs	9.87E-08	2	7.53E+03	1.68E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	137Cs	3.76E+01	30	3.13E+03	6.53E-02	204.254	20.265	2.011	0.199	0.020	0.002	0.000	0.000	0.000	0.000	0.000
U-203/SPR	137mBa	3.55E+01	4.860E-06	0.00E+00	6.16E-02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	151Sm	4.95E-02	90	1.36E-01	8.59E-05	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	152Eu	7.52E-05	14	5.42E+03	1.31E-07	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	154Eu	4.03E-04	9	5.89E+03	7.00E-07	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	155Eu	1.93E-03	5	1.60E+02	3.35E-08	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	226Ra	6.90E-13	1600	9.15E+03	1.20E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	228Ra	1.00E-13	6	5.78E+03	1.74E-16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	227Ac	1.14E-08	21.8	4.67E+03	1.98E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	229Th	2.54E-11	7340	2.60E+03	4.41E-14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	232Th	2.49E-14	1.410E+10	1.02E+03	4.32E-17	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	231Pa	5.75E-09	32760	2.31E+03	9.98E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	232U	1.06E-09	70	1.33E+03	1.84E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	233U	4.20E-11	1.592E+05	1.48E+02	7.29E-14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	234U	2.60E-05	2.455E+05	1.44E+02	4.51E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	235U	1.10E-06	7.038E+08	7.99E+02	1.91E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	236U	5.71E-07	2.342E+07	1.37E+02	9.91E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	238U	2.54E-05	4.468E+09	2.40E+02	4.41E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	237Np	3.38E-06	2.144E+06	4.29E+03	5.87E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	238Pu	2.16E-05	88	6.34E+02	3.75E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	239Pu	1.46E-03	2.411E+04	7.02E+02	2.53E-06	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
U-203/SPR	240Pu	2.07E-04	6564	7.02E+02	3.59E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	241Pu	9.02E-04	14	1.38E+01	1.57E-06	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	242Pu	5.35E-09	3.733E+05	6.68E+02	9.29E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	241Am	1.23E-06	432	7.80E+02	2.14E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	243Am	3.39E-12	7370	1.51E+03	5.89E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	242Cm	3.22E-09	0.443835616	1.44E+01	5.59E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	243Cm	6.40E-11	29	9.98E+02	1.11E-13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	244Cm	9.02E-11	18	3.89E+02	1.57E-13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203 Total						**218.045**	**21.347**	**2.112**	**0.211**	**0.023**	**4.87E-03**	**0.003**	**0.003**	**0.003**	**0.003**	**0.003**

Tank Name /Inventory	Radionuclide	Inventory	Half-Life	Unit Dose Factor	Exhumed Inventory	Suburban Resident with Vegetable Garden --> Dose at Year (mrem)										
		(Ci)	(Years)	(per Curie)	Ci	0	100	200	300	400	500	600	700	800	900	1000
U-204/SPR	63Ni	2.09E-03	100	1.56E+00	3.63E-06	0.000	0.000	0.000	0.000	0.000	1.77E-07	0.000	0.000	0.000	0.000	0.000
U-204/SPR	79Se	1.80E-06	6.500E+05	1.00E+01	3.13E-09	0.000	0.000	0.000	0.000	0.000	3.12E-06	0.000	0.000	0.000	0.000	0.000
U-204/SPR	90Sr	1.27E+01	29	3.59E+03	2.20E-02	79.174	7.254	0.665	0.061	0.006	5.11E-04	0.000	0.000	0.000	0.000	0.000
U-204/SPR	90Y	1.27E+01	0.007306	0.00E+00	2.20E-02	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000
U-204/SPR	93mNb	8.57E-05	16	5.40E-01	1.49E-07	0.000	0.000	0.000	0.000	0.000	3.15E-17	0.000	0.000	0.000	0.000	0.000
U-204/SPR	93Zr	7.42E-05	1.530E+06	3.37E-01	1.29E-07	0.000	0.000	0.000	0.000	0.000	4.34E-08	0.000	0.000	0.000	0.000	0.000
U-204/SPR	99Tc	5.97E-04	2.111E+05	5.06E+02	1.04E-06	0.001	0.001	0.001	0.001	0.001	5.24E-04	0.001	0.001	0.001	0.001	0.001
U-204/SPR	106Ru	1.71E-12	1	9.35E+02	2.97E-15	0.000	0.000	0.000	0.000	0.000	8.48E-163	0.000	0.000	0.000	0.000	0.000
U-204/SPR	113mCd	1.92E-04	14	1.15E+03	3.33E-07	0.000	0.000	0.000	0.000	0.000	6.80E-15	0.000	0.000	0.000	0.000	0.000
U-204/SPR	125Sb	1.04E-05	3	1.90E+03	1.81E-08	0.000	0.000	0.000	0.000	0.000	2.31E-55	0.000	0.000	0.000	0.000	0.000
U-204/SPR	126Sn	1.10E-05	1.000E+05	9.66E+03	1.91E-08	0.000	0.000	0.000	0.000	0.000	1.84E-04	0.000	0.000	0.000	0.000	0.000
U-204/SPR	129I	1.14E-06	1.570E+07	2.99E+02	1.98E-09	0.000	0.000	0.000	0.000	0.000	5.91E-07	0.000	0.000	0.000	0.000	0.000
U-204/SPR	134Cs	1.20E-07	2	7.53E+03	2.08E-10	0.000	0.000	0.000	0.000	0.000	8.67E-82	0.000	0.000	0.000	0.000	0.000
U-204/SPR	137Cs	4.64E+01	30	3.13E+03	8.08E-02	252.058	25.007	2.481	0.246	0.024	2.42E-03	0.000	0.000	0.000	0.000	0.000
U-204/SPR	137mBa	4.39E+01	4.860E-06	0.00E+00	7.62E-02	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000
U-204/SPR	151Sm	6.10E-02	90	1.36E-01	1.06E-04	0.000	0.000	0.000	0.000	0.000	3.06E-07	0.000	0.000	0.000	0.000	0.000
U-204/SPR	152Eu	9.27E-05	14	5.42E+03	1.61E-07	0.001	0.000	0.000	0.000	0.000	1.55E-14	0.000	0.000	0.000	0.000	0.000
U-204/SPR	154Eu	4.97E-04	9	5.89E+03	8.63E-07	0.005	0.000	0.000	0.000	0.000	9.60E-20	0.000	0.000	0.000	0.000	0.000
U-204/SPR	155Eu	2.39E-03	5	1.60E+02	4.15E-06	0.001	0.000	0.000	0.000	0.000	5.25E-34	0.000	0.000	0.000	0.000	0.000
U-204/SPR	226Ra	6.11E-13	1600	8.15E+03	1.06E-15	0.000	0.000	0.000	0.000	0.000	7.62E-12	0.000	0.000	0.000	0.000	0.000
U-204/SPR	228Ra	1.24E-13	6	5.78E+03	2.15E-16	0.000	0.000	0.000	0.000	0.000	1.02E-37	0.000	0.000	0.000	0.000	0.000
U-204/SPR	227Ac	1.41E-08	21.8	4.67E+03	2.45E-11	0.000	0.000	0.000	0.000	0.000	1.42E-14	0.000	0.000	0.000	0.000	0.000
U-204/SPR	229Th	3.14E-11	7340	2.60E+03	5.45E-14	0.000	0.000	0.000	0.000	0.000	1.35E-10	0.000	0.000	0.000	0.000	0.000
U-204/SPR	232Th	3.07E-14	1.410E+10	1.02E+03	5.33E-17	0.000	0.000	0.000	0.000	0.000	5.45E-14	0.000	0.000	0.000	0.000	0.000
U-204/SPR	231Pa	5.09E-08	32760	2.31E+03	8.84E-12	0.000	0.000	0.000	0.000	0.000	2.02E-06	0.000	0.000	0.000	0.000	0.000
U-204/SPR	232U	1.96E-08	70	1.33E+03	3.40E-11	0.000	0.000	0.000	0.000	0.000	3.21E-10	0.000	0.000	0.000	0.000	0.000
U-204/SPR	233U	7.80E-10	1.592E+05	1.48E+02	1.35E-12	0.000	0.000	0.000	0.000	0.000	2.00E-10	0.000	0.000	0.000	0.000	0.000
U-204/SPR	234U	4.81E-04	2.455E+05	1.44E+02	8.35E-07	0.000	0.000	0.000	0.000	0.000	1.20E-04	0.000	0.000	0.000	0.000	0.000
U-204/SPR	235U	2.05E-05	7.038E+08	7.99E+02	3.56E-08	0.000	0.000	0.000	0.000	0.000	2.84E-05	0.000	0.000	0.000	0.000	0.000
U-204/SPR	236U	1.06E-05	2.342E+07	1.37E+02	1.84E-08	0.000	0.000	0.000	0.000	0.000	2.52E-06	0.000	0.000	0.000	0.000	0.000
U-204/SPR	238U	4.69E-04	4.468E+09	2.40E+02	8.14E-07	0.000	0.000	0.000	0.000	0.000	1.95E-04	0.000	0.000	0.000	0.000	0.000
U-204/SPR	237Np	4.16E-06	2.144E+06	4.29E+03	7.22E-09	0.000	0.000	0.000	0.000	0.000	3.09E-05	0.000	0.000	0.000	0.000	0.000
U-204/SPR	238Pu	1.07E-03	88	6.34E+02	1.86E-06	0.001	0.001	0.000	0.000	0.000	2.29E-05	0.000	0.000	0.000	0.000	0.000
U-204/SPR	239Pu	7.24E-02	2.411E+04	7.02E+02	1.26E-04	0.088	0.088	0.088	0.088	0.087	8.70E-02	0.087	0.087	0.086	0.086	0.086
U-204/SPR	240Pu	1.02E-02	6564	7.02E+02	1.77E-05	0.012	0.012	0.012	0.012	0.012	1.18E-02	0.012	0.012	0.011	0.011	0.011
U-204/SPR	241Pu	4.45E-02	14	1.38E+01	7.73E-05	0.001	0.000	0.000	0.000	0.000	1.90E-14	0.000	0.000	0.000	0.000	0.000
U-204/SPR	242Pu	2.64E-07	3.733E+05	6.68E+02	4.58E-10	0.000	0.000	0.000	0.000	0.000	3.06E-07	0.000	0.000	0.000	0.000	0.000
U-204/SPR	241Am	6.09E-04	432	7.60E+02	1.06E-06	0.001	0.001	0.001	0.000	0.000	3.60E-04	0.000	0.000	0.000	0.000	0.000
U-204/SPR	243Am	1.68E-10	7370	1.51E+03	2.92E-13	0.000	0.000	0.000	0.000	0.000	4.21E-10	0.000	0.000	0.000	0.000	0.000
U-204/SPR	242Cm	1.58E-07	0.443835616	1.44E+01	2.74E-10	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000
U-204/SPR	243Cm	3.17E-09	29	9.98E+02	5.50E-12	0.000	0.000	0.000	0.000	0.000	3.54E-14	0.000	0.000	0.000	0.000	0.000
U-204/SPR	244Cm	4.47E-09	18	3.89E+02	7.78E-12	0.000	0.000	0.000	0.000	0.000	1.31E-17	0.000	0.000	0.000	0.000	0.000
U-204 Total						**331.345**	**32.364**	**3.247**	**0.408**	**0.131**	**1.03E-01**	**0.100**	**0.099**	**0.099**	**0.099**	**0.098**

Rural Farmer Scenario Calculation

Tank Series	C-100	Tank Series	C-200
Tank Diameter (ft)	75	Tank Diameter (ft)	20
Borehole Diameter (in)	10	Borehole Diameter (in)	10
(Borehole Radius)/(Tank Radius) Ratio	1.235E-04	(Borehole Radius)/(Tank Radius) Ratio	1.74E-03
Waste Form Factor (not used done on dose factor page), however used in formula keep value 1	1	Waste Form Factor (not used done on dose factor page), however used in formula keep value 1	1

Tank Name/Inventory	Radionuclide	Inventory (Ci)	Half-Life (Years)	Unit Dose Factor (per Curie)	Exhumed Inventory (Ci)	Rural Farmer with a Cow --> Dose at Year (mrem)										
						0	100	200	300	400	500	600	700	800	900	1000
U-201/SPR	3H	5.13E-04	12	1.33E-02	8.91E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	14C	8.21E-05	5730	1.36E+00	1.43E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	60Co	1.41E-05	5	4.78E+02	2.45E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	59Ni	2.32E-05	7.600E+04	3.23E-02	4.03E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	63Ni	2.07E-03	100	8.83E-02	3.59E-06	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	79Se	1.78E-06	6.500E+05	2.37E-01	3.09E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	90Sr	2.72E+00	29	9.73E+01	4.72E-03	0.460	0.042	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	90Y	2.72E+00	0.007306	0.00E+00	4.72E-03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	93mNb	8.44E-05	16	4.63E-03	1.47E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	93Zr	7.31E-05	1.530E+06	3.96E-03	1.27E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	99Tc	5.89E-04	2.111E+05	2.54E+00	1.02E-06	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	106Ru	1.69E-12	1	3.56E+01	2.93E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	113mCd	1.89E-04	14	7.61E+00	3.28E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	125Sb	1.03E-05	3	7.58E+01	1.79E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	126Sn	1.09E-05	1.000E+05	3.86E+02	1.89E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	129I	1.13E-06	1.570E+07	2.27E+01	1.96E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	134Cs	1.18E-07	2	3.00E+02	2.05E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	137Cs	4.58E+01	30	1.25E+02	7.95E-02	9.983	0.988	0.098	0.010	0.001	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	137mBa	4.33E+01	4.860E-06	0.00E+00	7.52E-02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	151Sm	6.00E-02	90	1.15E-03	1.04E-04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	152Eu	9.18E-05	14	2.17E+02	1.59E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	154Eu	4.91E-04	9	2.36E+02	8.52E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	155Eu	2.36E-03	5	6.41E+00	4.10E-06	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	226Ra	1.05E-12	1600	3.61E+02	1.82E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	228Ra	1.22E-13	6	2.26E+02	2.12E-16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	227Ac	1.39E-08	21.8	1.19E+02	2.41E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	229Th	3.10E-11	7340	8.63E+01	5.38E-14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	232Th	3.04E-14	1.410E+10	2.89E+01	5.28E-17	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	231Pa	8.77E-09	32760	4.42E+01	1.52E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	232U	3.40E-09	70	3.15E+01	5.90E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	233U	1.19E-10	1.592E+05	1.24E+00	2.07E-13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	234U	1.21E-04	2.455E+05	1.17E+00	2.10E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	235U	5.37E-06	7.038E+08	2.76E+01	9.32E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	236U	1.83E-06	2.342E+07	1.11E+00	3.18E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	238U	1.24E-04	4.468E+09	5.25E+00	2.15E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	237Np	4.11E-06	2.144E+06	5.31E+01	7.14E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	238Pu	1.08E-05	88	1.10E+01	1.88E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	239Pu	7.31E-04	2.411E+04	1.21E+01	1.27E-06	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	240Pu	1.03E-04	6564	1.21E+01	1.79E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	241Pu	4.49E-04	14	2.38E-01	7.80E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	242Pu	2.67E-09	3.733E+05	1.16E+01	4.64E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	241Am	6.12E-06	432	1.41E+01	1.06E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	243Am	1.70E-12	7370	4.42E+01	2.95E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	242Cm	1.60E-09	0.443835616	2.92E-01	2.78E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	243Cm	3.19E-11	29	2.93E+01	5.54E-14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201/SPR	244Cm	4.54E-11	18	7.05E+00	7.88E-14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-201 Total						10.423	1.031	0.102	0.010	0.001	1.28E-04	0.000	0.000	0.000	0.000	0.000

Tank Name /Inventory	Radionuclide	Inventory (Ci)	Half-Life (Years)	Unit Dose Factor (per Curie)	Exhumed Inventory Ci	Rural Farmer with a Cow --> Dose at Year (mrem)										
						0	100	200	300	400	500	600	700	800	900	1000
U-202/SPR	3H	5.08E-04	12	1.33E-02	8.92E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	14C	8.10E-05	5730	1.36E+00	1.41E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	60Co	1.40E-05	5	4.78E+02	2.43E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	59Ni	2.30E-05	7.600E+04	3.23E-02	3.99E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	63Ni	2.05E-03	100	8.83E-02	3.56E-06	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	79Se	1.78E-06	6.500E+05	2.37E-01	3.06E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	90Sr	9.79E-01	29	9.73E+01	1.70E-03	0.165	0.015	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	90Y	9.79E-01	0.007308	0.00E+00	1.70E-03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	93mNb	8.37E-05	16	4.63E-03	1.45E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	93Zr	7.25E-05	1.530E+06	3.98E-03	1.26E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	99Tc	5.84E-04	2.111E+05	2.54E+00	1.01E-06	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	106Ru	1.67E-12	1	3.56E+01	2.90E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	113mCd	1.87E-04	14	7.61E+00	3.25E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	125Sb	1.02E-05	3	7.58E+01	1.77E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	126Sn	1.08E-05	1.000E+05	3.86E+02	1.88E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	129I	1.12E-06	1.570E+07	2.27E+01	1.94E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	134Cs	1.17E-07	2	3.00E+02	2.03E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	137Cs	4.54E+01	30	1.25E+02	7.88E-02	8.876	0.980	0.097	0.010	0.001	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	137mBa	4.29E+01	4.860E-06	0.00E+00	7.45E-02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	151Sm	5.97E-02	90	1.15E-03	1.04E-04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	152Eu	9.08E-05	14	2.17E+02	1.58E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	154Eu	4.86E-04	9	2.36E+02	8.44E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	155Eu	2.33E-03	5	6.41E+00	4.05E-06	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	226Ra	8.78E-13	1600	3.61E+02	1.52E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	228Ra	1.21E-13	6	2.26E+02	2.10E-16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	227Ac	1.37E-08	21.8	1.19E+02	2.38E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	229Th	3.07E-11	7340	8.63E+01	5.33E-14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	232Th	3.01E-14	1.410E+10	2.89E+01	5.23E-17	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	231Pa	7.32E-09	32760	4.42E+01	1.27E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	232U	1.44E-09	70	3.15E+01	2.50E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	233U	5.74E-11	1.592E+05	1.24E+00	9.97E-14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	234U	3.55E-05	2.455E+05	1.17E+00	6.16E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	235U	1.52E-06	7.038E+08	2.76E+01	2.64E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	236U	7.84E-07	2.342E+07	1.11E+00	1.36E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	238U	3.46E-05	4.468E+09	5.25E+00	6.01E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	237Np	4.09E-06	2.144E+06	5.31E+01	7.08E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	238Pu	2.95E-05	88	1.10E+01	5.12E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	239Pu	1.99E-03	2.411E+04	1.21E+01	3.45E-06	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	240Pu	2.80E-04	6564	1.21E+01	4.86E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	241Pu	1.22E-03	14	2.38E-01	2.12E-06	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	242Pu	7.25E-09	3.733E+05	1.16E+01	1.26E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	241Am	1.67E-05	432	1.41E+01	2.90E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	243Am	4.62E-12	7370	4.42E+01	8.02E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	242Cm	4.38E-09	0.443835616	2.92E-01	7.60E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	243Cm	8.69E-11	29	2.93E+01	1.51E-13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202/SPR	244Cm	1.23E-10	18	7.05E+00	2.14E-13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-202 Total						10.042	0.995	0.099	0.010	0.001	1.54E-04	0.000	0.000	0.000	0.000	0.000

Tank Name /Inventory	Radionuclide	Inventory (Ci)	Half-Life (Years)	Unit Dose Factor (per Curie)	Exhumed Inventory Ci	Rural Farmer with a Cow --> Dose at Year (mrem)										
						0	100	200	300	400	500	600	700	800	900	1000
U-203/SPR	3H	4.22E-04	12	1.33E-02	7.33E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	14C	8.73E-06	5730	1.38E+00	1.17E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	60Co	1.16E-05	5	4.78E+02	2.01E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	59Ni	1.91E-05	7.600E+04	3.23E-02	3.32E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	63Ni	1.70E-03	100	8.83E-02	2.95E-06	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	79Se	1.46E-06	6.500E+05	2.37E-01	2.53E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	90Sr	1.89E+00	29	9.73E+01	3.28E-03	0.319	0.029	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	90Y	1.89E+00	0.007306	0.00E+00	3.28E-03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	93mNb	6.93E-05	16	4.63E-03	1.20E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	93Zr	6.01E-05	1.530E+06	3.96E-03	1.04E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	99Tc	4.84E-04	2.111E+05	2.54E+00	8.40E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	106Ru	1.39E-12	1	3.56E+01	2.41E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	113mCd	1.55E-04	14	7.61E+00	2.69E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	125Sb	8.43E-06	3	7.58E+01	1.46E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	126Sn	8.89E-06	1.000E+05	3.86E+02	1.54E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	129I	9.28E-07	1.570E+07	2.27E+01	1.61E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	134Cs	9.67E-06	2	3.00E+02	1.88E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	137Cs	3.76E+01	30	1.25E+02	6.53E-02	8.179	0.811	0.081	0.008	0.001	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	137mBa	3.55E+01	4.860E-06	0.00E+00	6.16E-02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	151Sm	4.95E-02	90	1.15E-03	8.59E-05	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	152Eu	7.52E-05	14	2.17E+02	1.31E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	154Eu	4.03E-04	9	2.36E+02	7.00E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	155Eu	1.93E-03	5	6.41E+00	3.35E-06	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	226Ra	6.90E-13	1600	3.61E+02	1.20E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	228Ra	1.00E-13	6	2.26E+02	1.74E-16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	227Ac	1.14E-08	21.8	1.19E+02	1.98E-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	229Th	2.54E-11	7340	8.63E+01	4.41E-14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	232Th	2.49E-14	1.410E+10	2.89E+01	4.32E-17	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	231Pa	5.75E-09	32760	4.42E+01	9.98E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	232U	1.06E-09	70	3.15E+01	1.84E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	233U	4.20E-11	1.592E+05	1.24E+00	7.29E-14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	234U	2.60E-05	2.455E+05	1.17E+00	4.51E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	235U	1.10E-06	7.038E+08	2.76E+01	1.91E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	236U	5.71E-07	2.342E+07	1.11E+00	9.91E-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	238U	2.54E-05	4.468E+09	5.25E+00	4.41E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	237Np	3.38E-06	2.144E+06	5.31E+01	5.87E-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	238Pu	2.16E-05	88	1.10E+01	3.75E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	239Pu	1.46E-03	2.411E+04	1.21E+01	2.53E-06	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	240Pu	2.07E-04	6564	1.21E+01	3.59E-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	241Pu	9.02E-04	14	2.36E-01	1.57E-06	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	242Pu	5.35E-09	3.733E+05	1.16E+01	9.29E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	241Am	1.23E-05	432	1.41E+01	2.14E-08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	243Am	3.39E-12	7370	4.42E+01	5.89E-15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	242Cm	3.22E-09	0.443635616	2.92E-01	5.59E-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	243Cm	6.40E-11	29	2.93E+01	1.11E-13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203/SPR	244Cm	9.02E-11	18	7.05E+00	1.57E-13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U-203 Total						8.499	0.841	0.083	0.008	0.001	1.24E-04	0.000	0.000	0.000	0.000	0.000

Tank Name /Inventory	Radionuclide	Inventory (Ci)	Half-Life (Years)	Unit Dose Factor (per Curie)	Exhumed Inventory Ci	Rural Farmer with a Cow --> Dose at Year (mrem)										
						0	100	200	300	400	500	600	700	800	900	1000
U-204/SPR	63Ni	2.09E-03	100	8.83E-02	3.63E-06	0.000	0.000	0.000	0.000	0.000	1.00E-08	0.000	0.000	0.000	0.000	0.000
U-204/SPR	79Se	1.80E-06	6.500E+05	2.37E-01	3.13E-09	0.000	0.000	0.000	0.000	0.000	7.39E-10	0.000	0.000	0.000	0.000	0.000
U-204/SPR	90Sr	1.27E-01	29	9.73E+01	2.20E-02	2.140	0.187	0.016	0.002	0.000	1.39E-05	0.000	0.000	0.000	0.000	0.000
U-204/SPR	90Y	1.27E+01	0.007306	0.00E+00	2.20E-02	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000
U-204/SPR	93mNb	8.57E-05	16	4.63E-03	1.49E-07	0.000	0.000	0.000	0.000	0.000	2.70E-19	0.000	0.000	0.000	0.000	0.000
U-204/SPR	93Zr	7.42E-05	1.530E+06	3.98E-03	1.29E-07	0.000	0.000	0.000	0.000	0.000	5.10E-10	0.000	0.000	0.000	0.000	0.000
U-204/SPR	99Tc	5.97E-04	2.111E+05	2.54E+00	1.04E-06	0.000	0.000	0.000	0.000	0.000	2.63E-06	0.000	0.000	0.000	0.000	0.000
U-204/SPR	106Ru	1.71E-12	1	3.56E+01	2.97E-15	0.000	0.000	0.000	0.000	0.000	3.23E-164	0.000	0.000	0.000	0.000	0.000
U-204/SPR	113mCd	1.92E-04	14	7.61E+00	3.33E-07	0.000	0.000	0.000	0.000	0.000	4.50E-17	0.000	0.000	0.000	0.000	0.000
U-204/SPR	125Sb	1.04E-05	3	7.58E+01	1.81E-08	0.000	0.000	0.000	0.000	0.000	9.22E-57	0.000	0.000	0.000	0.000	0.000
U-204/SPR	126Sn	1.10E-05	1.000E+05	3.86E+02	1.91E-08	0.000	0.000	0.000	0.000	0.000	7.35E-06	0.000	0.000	0.000	0.000	0.000
U-204/SPR	129I	1.14E-06	1.570E+07	2.27E+01	1.98E-09	0.000	0.000	0.000	0.000	0.000	4.49E-08	0.000	0.000	0.000	0.000	0.000
U-204/SPR	134Cs	1.20E-07	2	3.00E+02	2.08E-10	0.000	0.000	0.000	0.000	0.000	3.45E-83	0.000	0.000	0.000	0.000	0.000
U-204/SPR	137Cs	4.64E+01	30	1.25E+02	8.06E-02	10.094	1.001	0.099	0.010	0.001	9.70E-05	0.000	0.000	0.000	0.000	0.000
U-204/SPR	137mBa	4.39E+01	4.860E-06	0.00E+00	7.62E-02	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000
U-204/SPR	151Sm	5.10E-02	90	1.15E-03	1.06E-04	0.000	0.000	0.000	0.000	0.000	2.58E-09	0.000	0.000	0.000	0.000	0.000
U-204/SPR	152Eu	9.27E-05	14	2.17E+02	1.61E-07	0.000	0.000	0.000	0.000	0.000	6.20E-16	0.000	0.000	0.000	0.000	0.000
U-204/SPR	154Eu	4.97E-04	9	2.36E+02	8.63E-07	0.000	0.000	0.000	0.000	0.000	3.85E-21	0.000	0.000	0.000	0.000	0.000
U-204/SPR	155Eu	2.39E-03	5	8.41E+00	4.15E-06	0.000	0.000	0.000	0.000	0.000	2.10E-35	0.000	0.000	0.000	0.000	0.000
U-204/SPR	226Ra	6.11E-13	1600	3.61E+02	1.06E-15	0.000	0.000	0.000	0.000	0.000	3.08E-13	0.000	0.000	0.000	0.000	0.000
U-204/SPR	228Ra	1.24E-13	6	2.26E+02	2.15E-16	0.000	0.000	0.000	0.000	0.000	3.99E-39	0.000	0.000	0.000	0.000	0.000
U-204/SPR	227Ac	1.41E-08	21.8	1.19E+02	2.45E-11	0.000	0.000	0.000	0.000	0.000	3.64E-16	0.000	0.000	0.000	0.000	0.000
U-204/SPR	229Th	3.14E-11	7340	8.63E+01	5.45E-14	0.000	0.000	0.000	0.000	0.000	4.49E-12	0.000	0.000	0.000	0.000	0.000
U-204/SPR	232Th	3.07E-14	1.410E+10	2.89E+01	5.33E-17	0.000	0.000	0.000	0.000	0.000	1.54E-15	0.000	0.000	0.000	0.000	0.000
U-204/SPR	231Pa	5.09E-09	32760	4.42E+01	8.84E-12	0.000	0.000	0.000	0.000	0.000	3.87E-10	0.000	0.000	0.000	0.000	0.000
U-204/SPR	232U	1.98E-08	70	3.15E+01	3.40E-11	0.000	0.000	0.000	0.000	0.000	7.57E-12	0.000	0.000	0.000	0.000	0.000
U-204/SPR	233U	7.80E-10	1.592E+05	1.24E+00	1.35E-12	0.000	0.000	0.000	0.000	0.000	1.68E-12	0.000	0.000	0.000	0.000	0.000
U-204/SPR	234U	4.81E-04	2.455E+05	1.17E+00	8.35E-07	0.000	0.000	0.000	0.000	0.000	9.79E-07	0.000	0.000	0.000	0.000	0.000
U-204/SPR	235U	2.05E-05	7.038E+08	2.76E+01	3.56E-08	0.000	0.000	0.000	0.000	0.000	9.82E-07	0.000	0.000	0.000	0.000	0.000
U-204/SPR	236U	1.06E-05	2.342E+07	1.11E+00	1.84E-08	0.000	0.000	0.000	0.000	0.000	2.04E-08	0.000	0.000	0.000	0.000	0.000
U-204/SPR	238U	4.69E-04	4.468E+09	5.25E+00	8.14E-07	0.000	0.000	0.000	0.000	0.000	4.27E-06	0.000	0.000	0.000	0.000	0.000
U-204/SPR	237Np	4.16E-06	2.144E+06	5.31E+01	7.22E-09	0.000	0.000	0.000	0.000	0.000	3.83E-07	0.000	0.000	0.000	0.000	0.000
U-204/SPR	238Pu	1.07E-03	88	1.10E+01	1.86E-06	0.000	0.000	0.000	0.000	0.000	3.98E-07	0.000	0.000	0.000	0.000	0.000
U-204/SPR	239Pu	7.24E-02	2.411E+04	1.21E+01	1.26E-04	0.002	0.002	0.002	0.002	0.002	1.50E-03	0.001	0.001	0.001	0.001	0.001
U-204/SPR	240Pu	1.02E-02	6564	1.21E+01	1.77E-05	0.000	0.000	0.000	0.000	0.000	2.03E-04	0.000	0.000	0.000	0.000	0.000
U-204/SPR	241Pu	4.45E-02	14	2.38E-01	7.73E-05	0.000	0.000	0.000	0.000	0.000	3.27E-15	0.000	0.000	0.000	0.000	0.000
U-204/SPR	242Pu	2.64E-07	3.733E+05	1.16E+01	4.58E-10	0.000	0.000	0.000	0.000	0.000	5.31E-09	0.000	0.000	0.000	0.000	0.000
U-204/SPR	241Am	6.09E-04	432	1.41E+01	1.06E-06	0.000	0.000	0.000	0.000	0.000	6.68E-08	0.000	0.000	0.000	0.000	0.000
U-204/SPR	243Am	1.68E-10	7370	4.42E+01	2.92E-13	0.000	0.000	0.000	0.000	0.000	1.23E-11	0.000	0.000	0.000	0.000	0.000
U-204/SPR	242Cm	1.58E-07	0.443835616	2.92E-01	2.74E-10	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000
U-204/SPR	243Cm	3.17E-09	29	2.93E+01	5.50E-12	0.000	0.000	0.000	0.000	0.000	1.04E-15	0.000	0.000	0.000	0.000	0.000
U-204/SPR	244Cm	4.47E-09	18	7.05E+00	7.76E-12	0.000	0.000	0.000	0.000	0.000	2.38E-19	0.000	0.000	0.000	0.000	0.000
U-204 Total						12.242	1.200	0.119	0.013	0.003	1.84E-03	0.002	0.002	0.002	0.002	0.002

SPREADSHEET VERIFICATION FORM

1. SVF ~~RPP-20995, Rev. 0~~, CH 5/27/04
SVF-217 ~~Page 41~~ CH 5/27/04

2. **Spreadsheet Owner, Organization, MSIN, & Phone No.:**	D. Evans, CEES (Contractor), 946-7111
3. **Spreadsheet File Name, Rev. No./Version No.**	Risk Calcs, U200s TWRP, Rev.0.xls Intruder Calcs, U200s TWRP, Rev. 0.xls
4. **Location of Spreadsheet:** (Identify where the spreadsheet file is located by checking the boxes to the right. If "Other," provide description of where it is located)	**Personal Computer** ☐ **CD** ☐ **Network Drive** ☐ **Path** **Other** ☒ **Description** CEES (Contractor)
5. **Function and Purpose of Spreadsheet:** (Provide a brief description of the purpose of the spreadsheet)	U-200-series tanks long-term human health risk and intruder calculations to support waste retrieval work plan (RPP-20700).
6. **Scope of Verification:** (Indicate scope of verification by checking box to right. If "Other" provide description of scope)	**All Formulas in Spreadsheet** ☐ **Input Data only** ☐ **Formulas and Input Data** ☒ **Formula Changes** ☐ **Other** ☐ **Description**

7. **Method of Verification:** (Provide brief description of the method used to verify the spreadsheet. Note multiple methods may be used to verify different parts of a spreadsheet)

--Verified formulas used are correct for intended functions being calculated
--Performed hand calculations to verify values returned by formulas are correct (initial cells only for repeating formulas)
--Verified correct repetition used for repeating formulas
--Verified input data against data sources, checked for correct cell references in cells that call input data

8. **Verification Documentation:** (Provide description of where verification documentation may be located. The verification documentation should include a description of all unique intended formulae together with evidence that the interpretation of the formulae in the spreadsheet is correct and that the spreadsheet returns correct results)	**Attached:** ☐	**No. of Pages:**	
	Electronic Information File: ☐	**Ref:**	
	Engineering Document: ☒	**Ref:**	**RPP-20995, Rev. 0**

9. **Approvals**	Name:	Signature:	Date:
Spreadsheet Owner:	D. Evans	Doug Evans	5/27/2004
Spreadsheet Verifier:	D. Crumpler	Dwayne Crumpler	5/27/04
Owner's Manager:	C. Henderson	Carl Henderson	5/27/04