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List of Acronyms and Abbreviations

3D	Three dimensional
CA	Composite analysis
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Ci	curie
CIG	Component-In-Grout
DOE	Department of Energy
ELLWF	E-Area Low-Level Waste Facility
EPA	Environmental Protection Agency
ET	Engineered Trench
ILV	Intermediate Level Vault
LAWV	Low Activity Waste Vault
LLW	Low-level radioactive waste
NR	Naval Reactor
PA	Performance Assessment
SA	Special Analysis
SCDHEC	South Carolina Department of Health and Environmental Control
SOF	Sum-of-Fractions of disposal limits
SRS	Savannah River Site
SRTC	Savannah River Technology Center
WITS	Waste Information Tracking System

1.0 Executive Summary

Projected impacts on disposal limits of various studies have been estimated. Interim measures to compensate for the impacts are needed for the Engineered Trench and the Intermediate Level Vault. Interim measures are due to projected decreases in the radionuclide disposal limits derived from the groundwater pathway as a result of the Aquifer Source Node study and consideration of potential artificial dilution caused by the large size of the grid elements in the Intermediate Level Vault groundwater model.

2.0 Introduction

Disposal of low-level radioactive waste (LLW) at the Savannah River Site (SRS) E-Area Low-Level Waste Facility (ELLWF) is regulated in part by radionuclide disposal limits determined in the ELLWF performance assessment (PA)[1] and composite analysis (CA)[2]. Each year, in accordance with DOE requirements to maintain the PA and CA[3,4], an annual review of the ELLWF operations and relevant technical studies is conducted[5].

Recently, it became evident that, in the development of the groundwater model for the Slit Trenches, the selection of aquifer source nodes (i.e., the spatial elements of the saturated zone model into which the flux of radionuclides from the unsaturated zone model is introduced) was not optimum[6]. Optimizing the source nodes would likely result in increases in the resulting groundwater concentrations, which would suggest that the radionuclide disposal limits should be reduced. However, other studies may result in increases in disposal limits[7]. Therefore, a decision was made to develop and implement an annual summary of the potential impact of technical studies and other information on radionuclide disposal limits and whether mitigating measures should be imposed pending completion and implementation of the studies. This report is the first such summary.

3.0 Discussion

Two assessments serve as the basis of this summary report. In the first, the current (i.e., as of 4/16/03) state of disposals in the ELLWF (i.e., inventory of all radionuclides disposed versus disposal limits) was assessed by Solid Waste Engineering[8]. The Solid Waste Engineering assessment defines the primary isotopes of concern (i.e., those isotopes whose disposed inventory is one percent or greater of their disposal limit) and their relative contributions to the current sum-of-fractions (SOF) for each disposal unit. Also, provided is the current volume fraction filled for each disposal unit.

In the second assessment, an estimate of the potential impact on disposal limits of various studies (i.e., aquifer source node optimization, timing of doses, three-dimensional trench model, less conservative air analysis, and artificial dilution for the Intermediate Level Vault (ILV))[9] was performed by SRTC. Results of this assessment are summarized in Tables A1 through A7 in Appendix A, which show the potential impact of each study on PA-derived limits or disposal unit inventory. Both of these reports are attached.

Finally, potential changes in the point of assessment, duration of institutional controls, and time of compliance were considered[10] that might mitigate potential impacts. These considerations are discussed in the section on Assumptions. All this information has been condensed into a semi-quantitative summary assessment of impacts on disposal limits for each of the ELLWF disposal units in this report. The following section describes the methodology used to arrive at estimations of impact.

4.0 Methodology

This summary report relies on estimation of impacts from ongoing studies this fiscal year. An assessment of the seven active or filled disposal units in the ELLWF is summarized in Appendix A in Tables A1-A7. Each disposal unit table reflects the estimated impacts for primary isotopes of concern. Those isotopes whose disposed inventory is =1% of their disposal limit were identified as the primary isotopes of concern for each disposal unit. Associated with each isotope is the pathway to exposure that limits that particular radionuclide. Therefore estimated impacts are specific to the disposal unit, isotope of concern, limiting pathway and particular study under consideration. For example, Table A1 for Slit Trench #1 identifies six radionuclides as primary isotopes of concern which are limited by two pathways (Table 1). The remaining two pathways (i.e., Intruder and Radon) are unaffected.

Table 1 Radionuclides Representing Top 1% of Current Slit Trench Inventory

Primary Isotope of Concern	Limiting Pathway
H-3	Groundwater
I-129 (F-Area Filtercake)	Groundwater
Np-237	Groundwater
C-14	Air
I-129 (Generic)	Groundwater
U-238	Groundwater

The outcome of each study is reflected in each disposal unit table as an estimated impact to the current inventory limit for the radionuclide of concern, or change in the sum-of-fractions calculation in the case of the Timing of Doses study. Estimated impacts are presented based on our current knowledge regarding the outcome of a particular study. Of the four studies under consideration only one, the Aquifer Source Node Study, has been completed. For the remaining studies, the state of our knowledge is incomplete and can range from total uncertainty as to the outcome for a particular inventory limit, to being able to apply an estimated factor to the inventory limit. Taking Table A1 again, the estimated impact of the Aquifer Source Node study for ^{3}H is a 0.67x reduction in the limit, whereas the impact on tritium from the 3D Trench Modeling study is unknown due to the uncertainty associated with development of a new model representing the vadose zone.

5.0 Assumptions

A crucial consideration is whether a study represents a different modeling approach and/or a change in a fundamental assumption under which the E-Area PA was developed and approved, and whether the change is justified. For example, the results of the point source study[9] have raised questions over whether it is appropriate to consider waste packages more concentrated than the average over the entire disposal unit in establishing waste disposal limits. Similarly, the point source study has raised questions over the interpretation of groundwater modeling results that represent only a small fraction of the affected groundwater. Recent discussions with respect to the potential impact of CERCLA considerations on this issue[11] suggest that the current assumptions for the point of compliance (i.e., 100-meters from the disposed waste, averaged over the dimensions of the disposal unit) and the impact of institutional control on groundwater protection would not have been challenged by the regulators. It is also clear that radical changes (e.g., moving the point of compliance from the 100 meter well to the seepline at the nearest surface stream) cannot be made without prior agreement by the regulators (i.e., EPA and SCDHEC). Thus, the potential impact of the point source study is not included in this summary report and should not be considered until a definitive position is taken by the Site. These topics are being addressed in position papers being drafted by SRTC later this year[12].

Another consideration is the time of compliance for the PA[10]. The current SRS position in the PA is 10,000 years. Preliminary discussions indicate that it should certainly be no greater than 1,000 years for the intruder analysis and can likely be changed to 1,000 years for the other analyses as well. The potential impact of changing the time of compliance is included in this summary report. However implementing the change should not be considered until a definitive position is taken by the Site. This topic is also being addressed in a position paper by SRTC this year.

The following is a presentation and discussion of the results of this assessment for each ELLWF disposal unit.

6.0 Results

6.1 Slit Trench #1

The current total sum-of-fractions of the radionuclide limits for the first set of Slit Trenches[8] is 0.882; considering only the primary isotopes of concern, the sum-of-fractions is 0.854. Table A1 shows the projected impact on the first set of Slit Trenches (i.e., slit trench #1), for the primary isotopes of concern (i.e., those contributing one percent or more to the total sum-of-fractions of the disposal limits). The estimated impact of the aquifer source node study is that the radionuclide disposal limits for the groundwater pathway would decrease by about 1.5 times (i.e., if the aquifer source node study results were to be used to revise disposal limits, the revised limits would be about 67% of the current limits).

The impacts of the three-dimensional trench model study are uncertain at this time. No impact will be estimated.

The impact of the less conservative air analysis[13] will only impact the ^{14}C limit, which will increase by about 50 times.

If the timing of dose study were implemented, the individual radionuclide limits would not increase. However, since the limits would be applied to specific radionuclides or to small groups of radionuclides, the sum-of-fractions would not encompass every radionuclide being disposed and the quantity of radionuclides that could be disposed would increase. For example, the inventory of tritium and of generic ^{129}I (i.e., waste which would exhibit a low K_d for ^{129}I) that could be disposed would increase by about 30% because they are being considered separately from other radionuclides. For radionuclides with relatively high K_d (i.e., ^{129}I in F-Area Filter cake, ^{237}Np, and ^{238}U), the inventory that could be disposed would increase by 15 times. For ^{14}C, the inventory that could be disposed would increase by 44 times.

To estimate the aggregate effect of these potential changes, the projected impact of the various studies were used to adjust the PA limits. Table 2 shows the results.

Table 2 Estimated Aggregate Effects of Studies On Slit Trench #1

Primary Isotopes Of Concern	Slit Trench #1 (Ci)	Slit Trenches PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	Adjusted Slit Trenches PA Limit (Ci)	Fraction of Adjusted PA Limits	Fraction of Adjusted PA Early Well Limits	Fraction of Adjusted PA Late Well Limits	Fraction of Adjusted PA Air Limits
^{3}H	4.71E+00	6.3E+00	6.70E-01		4.2E+00	1.116	1.116		
^{129}I F Area Filtercake	8.14E-05	3.2E-03	6.70E-01		2.1E-03	0.038		0.038	
^{237}Np	1.09E-03	4.8E-02	6.70E-01		3.2E-02	0.034		0.034	
^{14}C	6.09E-02	2.7E+00		5.00E+01	1.4E+02	0.0005			0.0005
^{129}I Generic	1.87E-05	1.0E-03	6.70E-01		6.7E-04	0.028	0.028		
^{238}U	1.24E-01	7.4E+00	6.70E-01		5.0E+00	0.025		0.025	
					Sum-of-Fractions	1.241	1.144	0.097	0.0005

For the first set of Slit Trenches, none of the primary isotopes of concern are limited by the intruder pathway. The analysis of the air pathway for ^{14}C did not consider the time over which the ^{14}C would be released to the surface[1], thus changing the assumed time of compliance will not impact the ^{14}C limit. For the groundwater radionuclides, the times of the peak groundwater concentrations are less than 1,000 years[1,14]. Therefore, changing the time of compliance would not change any of the slit trench limits.

When the studies discussed above are implemented, the largest sum-of-fractions for the first set of Slit Trenches will be that for the adjusted early well limits (i.e., limits for radionuclides that reach their groundwater peak concentration within about 50 years), which is 1.144. The sum-of-fractions is dominated by tritium. The tritium disposed in the first set of Slit Trenches is 4.71 Ci[8]. However, most of the tritium comes from disposal of rubble from 232-F[15]. The tritium content of the rubble is 3.868 Ci, which leaves 0.842 Ci from other wastes. The other wastes' fraction of the adjusted tritium limit is 0.199. The tritium limit derived from the PA, and the adjusted limit above, assumes that all the tritium in the waste is completely soluble and immediately available to infiltrating water. The tritium in the 232-F rubble is contained within the concrete matrix of the rubble. If leaching tests were performed, it is likely that the tritium would be released more slowly than the immediate release assumed in the PA, which would result in the tritium disposal limit for 232-F rubble increasing. A recent study[16] of the release of tritium from bulk concrete indicates that the tritium limit for the 232-F rubble would be at least two times greater than the current PA tritium limit. Another study[17] indicates the 232-F rubble should have a tritium limit four times that for generic waste. If the tritium limit for the 232-F rubble increased by a factor of 2, the fraction of that limit for the rubble would be 0.458 and the sum-of-fractions of the adjusted early well limits (i.e., generic tritium, tritium in 232-F rubble and generic ^{129}I) would be 0.686. Table 3 shows the results of implementing a tritium limit specifically for the 232-F rubble, in addition to the other studies.

Table 3 Estimated Aggregate Effects of Studies On Slit Trench #1, including 232-F rubble tritium limit

Primary Isotopes Of Concern	Slit Trench #1 (Ci)	Slit Trenches PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	232-F Tritium Limit	Adjusted Slit Trenches PA Limit (Ci)	Fraction of Adjusted PA Limits	Fraction of Adjusted PA Early Well Limits	Fraction of Adjusted PA Late Well Limits	Fraction of Adjusted PA Air Limits
^{3}H, generic	8.42E-01	6.3E+00	6.70E-01			4.2E+00	0.199	0.199		
^{3}H, 232-F Rubble	3.87E+00		6.70E-01		1.26E+01	8.4E+00	0.458	0.458		
^{129}I F Area Filtercake	8.14E-05	3.2E-03	6.70E-01			2.1E-03	0.038		0.038	
^{237}Np	1.09E-03	4.8E-02	6.70E-01			3.2E-02	0.034		0.034	
^{14}C	6.09E-02	2.7E+00		5.00E+01		1.4E+02	0.0005			0.0005
^{129}I Generic	1.87E-05	1.0E-03	6.70E-01			6.7E-04	0.028	0.028		
^{238}U	1.24E-01	7.4E+00	6.70E-01			5.0E+00	0.025		0.025	
						Sum-of-Fractions	0.783	0.686	0.097	0.0005

Another mitigating factor for tritium in the Slit Trenches is the depth of the groundwater. In the PA[1], the depth of the groundwater table was assumed to be about 25 feet below the bottom of the trench, or about 45 feet below grade. Recent data show that the groundwater in the vicinity of the Slit Trenches is actually about 70 feet below grade, which means that the bottoms of the Slit Trenches are about 50 feet above the groundwater table rather than the 25 feet modeled in the PA. In the PA, the tritium peak groundwater concentration from the Slit Trenches occurred in about nine years. Most of that time is due to groundwater flow in the unsaturated zone (i.e., above the groundwater table). Since the distance between the Slit Trenches and the groundwater table is actually twice that assumed in the PA, the tritium travel time will also increase by about a factor of two (i.e., it will take an additional nine years for the tritium concentration to peak). The additional nine years will result in about 40% of the tritium decaying, which would increase the tritium disposal limit by about 60%.

6.2 Slit Trench #2

The current total sum-of-fractions of the radionuclide limits for the second set of Slit Trenches[8] is 0.508; considering only the primary isotopes of concern, the sum-of-fractions is 0.490. Table A2 shows the projected impact on the second set of Slit Trenches (i.e., slit trench #2), for the primary isotopes of concern. The estimated impacts of the various studies are similar to those for slit trench #1, the differences being caused by different primary isotopes of concern. The estimated impact of the aquifer source node study is that the radionuclide disposal limits for the groundwater pathway would decrease by about 1.5 times (i.e., if the aquifer source node study results were to be used to revise disposal limits, the revised limits would be about 67% of the current limits).

The impacts of the three-dimensional trench model study are uncertain at this time. No impact will be estimated.

The impact of the less conservative air analysis[13] will only impact the ^{14}C limit, which will increase by about 50 times.

If the timing of dose study were implemented, the individual radionuclide limits would not increase. However, since the limits would be applied to specific radionuclides or to small groups of radionuclides, the sum-of-fractions would not encompass every radionuclide being disposed and the quantity of radionuclides that could be disposed would increase. The inventory of tritium, ^{99}Tc, and generic ^{129}I (i.e., waste which would exhibit a low K_d for ^{129}I) that could be disposed would increase by about 7.5 times. For radionuclides with relatively high K_d (i.e., ^{129}I in F-Area Filter cake, ^{129}I in F-Area CG8, ^{129}I in F-Area Dowex 21K, ^{237}Np, ^{233}U, ^{234}U, and ^{238}U), the inventory that could be disposed would increase by 4.9 times. For ^{14}C, the inventory that could be disposed would increase by 23 times. For ^{238}U in M-Area Glass, the inventory that could be disposed would increase by 19 times and for ^{234}U in M-Area Glass, the inventory that could be disposed would increase by 18 times.

To estimate the aggregate effect of these potential changes, the projected impact of the various studies were used to adjust the PA limits. Table 4 shows the results.

Table 4 Estimated Aggregate Effects of Studies on Slit Trench #2

Primary Isotopes of Concern	Slit Trench #2 (Ci)	Slit Trench PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	Adjusted Slit Trench PA Limit (Ci)	Fraction of Adjusted PA Limits	Fraction of Adjusted PA Early Well Limits	Fraction of Adjusted PA Late Well Limits	Fraction of Adjusted PA Resident Limit	Fraction of Adjusted PA Air Limits	Fraction of PA Radon Limit
H3	6.00E-01	6.3E+00	6.7E-01		4.2E+00	0.142	0.142				
I129 F-Area Filtercake	2.56E-04	3.2E-03	6.7E-01		2.1E-03	0.120		0.120			
U234 M Area Glass	2.80E+00	4.9E+01			4.9E+01	0.057					0.057
U238 M Area Glass	1.05E+01	2.0E+02			2.0E+02	0.053			0.053		
C14	1.20E-01	2.7E+00		5.0E+01	1.4E+02	0.0009				0.0009	
U238	3.10E-01	7.4E+00	6.7E-01		5.0E+00	0.063		0.063			
Np237	1.54E-03	4.8E-02	6.7E-01		3.2E-02	0.048		0.048			
Tc99	1.47E-02	6.1E-01	6.7E-01		4.1E-01	0.036	0.036				
I129 F-Area CG-8	4.99E-05	3.2E-03	6.7E-01		2.1E-03	0.023		0.023			
I129 Generic	1.38E-05	1.0E-03	6.7E-01		6.7E-04	0.021	0.021				
U234	1.37E-01	1.1E+01	6.7E-01		7.4E+00	0.019		0.019			
I129 F-WTU Dowex 21K	4.32E-03	4.2E-01	6.7E-01		2.8E-01	0.015		0.015			
U233 Depleted	1.92E-02	1.9E+00	6.7E-01		1.3E+00	0.015		0.015			
					Sum-of-Fractions	**0.612**	**0.199**	**0.302**	**0.053**	**0.0009**	**0.057**

For the second set of Slit Trenches, only ^{238}U in M-Area glass is limited by the resident intruder pathway[18]. For the Slit Trenches, the resident scenario is assessed at 100 years[1], the presumed end of institutional controls. If the institutional control period were to be increased to 300 years, the ^{238}U limit in M-Area glass would not change, due to the very long half-life of the isotope.

The analysis of the air pathway for ^{14}C did not consider the time over which the ^{14}C would be released to the surface[1], thus changing the assumed time of compliance will not impact the ^{14}C limit. For the groundwater radionuclides, the times of the peak groundwater concentrations are less than 1,000 years[1,14] except for the uranium isotopes. For the uranium isotopes not in M-Area glass, the maximum groundwater concentrations are only slightly greater than 1,000 years. Therefore, changing the time of compliance would not significantly change any of the slit trench limits.

When the studies discussed above are implemented, the largest sum-of-fractions for the second set of Slit Trenches will be 0.302 for the late well limits. If the timing of doses study were not implemented, the sum-of-fractions of the adjusted limits would be 0.612.

6.3 Engineered Trench #1

The current total sum-of-fractions of the radionuclide limits for the first Engineered Trench (ET)[8] is 0.380; considering only the primary isotopes of concern, the sum-of-fractions is 0.361. Table A3 shows the projected impact on the engineered trench for the primary isotopes of concern. The estimated impacts of the various studies are similar to those for slit trench #1. The estimated impact of the aquifer source node study is that the radionuclide disposal limits for the groundwater pathway would decrease by about 1.5 times (i.e., if the aquifer source node study results were to be used to revise disposal limits, the revised limits would be about 67% of the current limits).

The impacts of the three-dimensional trench model study are uncertain at this time. No impact will be estimated.

The impact of the less conservative air analysis[13] will only impact the ^{14}C limit, which will increase by about 50 times.

If the timing of dose study were implemented, the individual radionuclide limits would not increase. However, since the limits would be applied to specific radionuclides or to small groups of radionuclides, the sum-of-fractions would not encompass every radionuclide being disposed and the quantity of radionuclides that could be disposed would increase. The inventory of tritium, ^{99}Tc, and generic ^{129}I (i.e., waste which would exhibit a low K_d for ^{129}I) that could be disposed would increase by about 4.6 times. For radionuclides with relatively high K_d (i.e., ^{90}Sr, ^{129}I in F-Area Filter cake, and uranium isotopes), the inventory that could be disposed would increase by 8.1 times. For ^{14}C, the inventory that could be disposed would increase by 53 times.

To estimate the aggregate effect of these potential changes, the projected impact of the various studies were used to adjust the PA limits. Table 5 shows the results.

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

Primary Isotopes of Concern	Engr. Trench #1 (Ci)	Engr. Trench PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	Adjusted Engr. Trench PA Limits (Ci)	Fraction of Adjusted PA Limits	Fraction of Adjusted PA Early Well Limits	Fraction of Adjusted PA Late Well Limits	Fraction of Adjusted PA Air Limit
H3	9.41E-01	6.3E+00	6.7E-01		4.2E+00	0.223	0.223		
U233	7.33E-02	1.9E+00	6.7E-01		1.3E+00	0.058		0.058	
I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
					Sum-of-Fractions	**0.511**	**0.325**	**0.185**	**0.0004**

For the ET, none of the primary isotopes of concern are limited by the intruder pathway. The analysis of the air pathway for ^{14}C did not consider the time over which the ^{14}C would be released to the surface[1], thus changing the assumed time of compliance will not impact the ^{14}C limit. For the groundwater radionuclides, the time of the peak groundwater concentrations are less than 1,000 years[1,14] except for the uranium isotopes. For the uranium isotopes, the maximum groundwater concentrations are only slightly greater than 1,000 years. Therefore, changing the time of compliance would not significantly change any of the ET limits.

When the studies discussed above are implemented, the largest sum-of-fractions for the engineered trench will be 0.325 for the early well limits. If the timing of doses study were not implemented, the sum-of-fractions of the adjusted limits would be 0.511.

6.4 Component-In-Grout Trench

The current total sum-of-fractions of the radionuclide limits for the Component-In-Grout (CIG) trench[8] is 0.021. The CIG Trench has no radionuclide that contributes 0.01 or more to the sum-of-fractions; the sum-of-fractions for the two radionuclides that contribute the most to the sum-of-fractions is 0.018. Table A4 shows the projected impact on the CIG Trench for the radionuclides contributing the most to the sum-of-fractions. The estimated impact of the aquifer source node study is that there will be no impact on radionuclide disposal limits for the groundwater pathway.

The impacts of the three-dimensional trench model study are uncertain at this time. No impact will be estimated.

The impact of the less conservative air analysis[13] will only impact the ^{14}C limit, which will increase by about 50 times.

If the timing of dose study were implemented, the individual radionuclide limits would not increase. However, since the limits would be applied to specific radionuclides or to small groups of radionuclides, the sum-of-fractions would not encompass every radionuclide being disposed and the quantity of radionuclides that could be disposed would increase. The inventory that could be disposed for generic ^{129}I (i.e., waste which would exhibit a low K_d for ^{129}I) would increase by about 100 times. For ^{14}C, the inventory that could be disposed would increase by 125 times.

To estimate the aggregate effect of these potential changes, the projected impact of the various studies were used to adjust the PA limits. Table 6 shows the results.

Table 6 Estimated Aggregate Effects of Studies on Component-In-Grout Trench

Primary Isotopes of Concern	CIG Trench (Ci)	CIG Trench PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	Adjusted CIG Trench PA Limits (CI)	Fraction of Adjusted PA Limit	Fraction of Adjusted PA Groundwater Limit	Fraction of Adjusted PA Air Limit
I-129	4.16E-06	4.2E-04			4.2E-04	0.010	0.010	
C-14	2.15E-02	2.7E+00		5.0E+01	1.4E+02	0.0002		0.0002
					Sum-of-Fractions	**0.010**	**0.010**	**0.0002**

For the CIG Trench, none of the primary isotopes of concern are limited by the intruder pathway. The analysis of the air pathway for ^{14}C did not consider the time over which the ^{14}C would be released to the surface[1], thus changing the assumed time of compliance will not impact the ^{14}C limit. For ^{129}I, which is limited by the groundwater pathway, the time of the peak groundwater concentration is less than 1,000 years[1,14]. Therefore, changing the time of compliance would not significantly change any of the CIG Trench limits.

When the studies discussed above are implemented, the largest sum-of-fractions for the CIG Trench will be 0.010 for the groundwater limit. Even if the timing of doses study were not implemented, the sum-of-fractions of the adjusted limits would still be only 0.010.

Recently, the Special Analysis for the CIG Trench was revised[19]. The revised limits account for additional radionuclides, the less-conservative air analysis, and other factors. Table 7 shows the current (i.e., as of 4/16/03) CIG trench inventory compared with the revised limits and Table 8 shows the sum-of-fractions for significant radionuclides using the revised limits.

Table 7 Determine the Sum-of-Fractions for CIG Trench #1 and all contributing isotopes using Revised Limits from WSRC-RP-99-00596, Rev. 1

ISOTOPE	CIG Trenches #1 Activity (Ci)	CIG Trenches #1 SA Revised Limit (Ci)	Fraction Of SA Revised Limit
Other Alpha	4.95E-05	No Limit	0.00E+00
AM241	1.46E-02	2.7E+02	5.41E-05
AM243	7.48E-04	**8.8E+00**	**8.50E-05**
Other Beta Gamm	4.71E-04	No Limit	0.00E+00
BA137M	1.90E+03	No Limit	0.00E+00
C14	2.15E-02	**5.7E+01**	**3.77E-04**
CE144	5.66E-03	No Limit	0.00E+00
CF249	8.77E-05	**3.6E+01**	**2.43E-06**
CF251	8.78E-05	**1.4E+03**	**6.27E-08**
CF252	8.76E-05	**4.5E+07**	**1.95E-12**
CM243	1.47E-04	**2.5E+06**	**5.89E-11**
CM244	1.96E-01	**4.3E+04**	**4.55E-06**
CM245	1.54E-05	**3.0E+01**	**5.14E-07**
CM246	8.76E-05	**1.2E+02**	**7.30E-07**
CM247	8.76E-05	**9.5E+00**	**9.22E-06**
CM248	8.76E-05	**3.1E+01**	**2.82E-06**
CO60	6.82E-03	2.1E+09	3.25E-12
CS134	1.91E-05	No Limit	0.00E+00
CS135	4.34E-06	**5.1E+02**	**8.50E-09**
CS137	2.01E+03	2.2E+06	9.13E-04
EU152	4.24E-06	**2.4E+06**	**1.77E-12**
EU154	4.85E-04	3.6E+07	1.35E-11
EU155	2.77E-03	No Limit	0.00E+00
FE55	8.99E-06	No Limit	0.00E+00
H3	2.81E+02	**1.8E+06**	**1.56E-04**
I129	4.16E-06	**6.1E-04**	**6.82E-03**
NI59	3.20E-04	**9.3E+02**	**3.44E-07**
NI63	3.34E-03	1.3E+06	2.57E-09
NP237	4.99E-04	**3.7E-01**	**1.35E-03**
PA233	5.42E-06	No Limit	0.00E+00
PA234M	5.73E-04	No Limit	0.00E+00
PD107	6.76E-06	**1.8E+03**	**3.75E-09**
PM147	5.45E-04	No Limit	0.00E+00
PR144	5.58E-03	No Limit	0.00E+00
PR144M	7.73E-07	No Limit	0.00E+00
PU238	1.10E-01	1.4E+04	7.83E-06
PU239	4.24E-02	1.3E+02	3.27E-04
PU240	1.67E-02	**2.7E+00**	**6.17E-03**

Table 7, continued Determine the Sum-of-Fractions for CIG Trench #1 and all contributing isotopes using Revised Limits from WSRC-RP-99-00596, Rev. 1

ISOTOPE	CIG Trenches #1 Activity (Ci)	CIG Trenches #1 SA Revised Limit (Ci)	Fraction Of SA Revised Limit
PU241	1.99E-01	8.0E+03	2.48E-05
PU242	3.12E-05	**1.0E+00**	**3.12E-05**
RB87	5.25E-12	**1.4E+01**	**3.75E-13**
RH106	1.39E-04	No Limit	0.00E+00
RU106	1.39E-04	No Limit	0.00E+00
SB125	1.51E-03	No Limit	0.00E+00
SB126	1.08E-05	No Limit	0.00E+00
SB126M	1.08E-05	No Limit	0.00E+00
SE79	3.32E-04	**9.3E+01**	**3.57E-06**
SM151	7.59E-03	3.1E+07	2.45E-10
SN126	1.55E-05	**4.6E+00**	**3.38E-06**
SR85	1.28E-06	No Limit	0.00E+00
SR90	5.26E-01	**1.6E+05**	**3.29E-06**
TC99	2.11E-04	**3.8E-01**	**5.55E-04**
TH231	6.11E-06	No Limit	0.00E+00
TH234	5.73E-04	No Limit	0.00E+00
U232	3.27E-08	1.7E+03	1.93E-11
U233	5.19E-05	**2.3E+01**	**2.26E-06**
U233 Depleted	7.87E-07	**2.3E+01**	**3.42E-08**
U234	1.07E-03	**2.3E+01**	**4.66E-05**
U235	2.10E-05	**1.1E+01**	**1.91E-06**
U235 Depleted	1.67E-06	**1.1E+01**	**1.51E-07**
U236	5.33E-05	**2.4E+01**	**2.22E-06**
U238	6.38E-04	1.2E+02	5.32E-06
Y90	5.17E-01	No Limit	0.00E+00
ZR93	1.02E-03	**4.0E+04**	**2.54E-08**
		Sum-of-Fraction	**1.70E-02**

Identify the Significant Isotopes

Significant Isotopes	CIG Trenches #1 Activity (Ci)	CIG Trenches #1 PA Limit (Ci)	Fraction Of PA Limit
I-129	4.16E-06	**6.1E-04**	**6.82E-03**
Pu-240	1.67E-02	**2.7E+00**	**6.17E-03**
Np-237	4.99E-04	**3.7E-01**	**1.35E-03**
Cs-137	2.01E+03	2.2E+06	9.13E-04
Tc-99	2.11E-04	**3.8E-01**	**5.55E-04**
C-14	2.15E-02	**5.7E+01**	**3.77E-04**
		Sum of Fractions	**1.619E-02**

Values in **Bold** represent changes from OBU-SWE-2003-00058

Table 8 Estimated Aggregate Effects of Studies on Component-In-Grout Trench, using Revised Limits

Significant Isotopes	CIG Trench (Ci)	Revised[a] CIG Trench SA Limit (Ci)	Fraction of Revised SA Limit	Fraction of Revised SA Early Well Groundwater Limit	Fraction of Revised SA Late Well Groundwater Limit	Fraction of Revised SA Resident Limit
I-129	4.16E-06	6.1E-04	0.00682	0.00682		
Pu-240	1.67E-02	2.7E+00	0.00619		0.00619	
Np-237	4.99E-04	3.7E-01	0.00135		0.00135	
Cs-137	2.01E+03	2.2E+06	0.00091			0.00091
Tc-99	2.11E-04	3.8E-01	0.00056	0.00056		
C-14	2.15E-02	5.7E+01	0.00038	0.00038		
		Sum-of-Fractions	**0.016**	**0.008**	**0.008**	**0.00091**

[a] Limits derived from reference 19

Implementing the revised CIG limits[19] will reduce the sum-of-fractions from 0.021 to 0.017. Using the revised limits and implementing the timing of dose will reduce the largest sum-of-fractions from 0.010 to 0.008.

6.5 Low Activity Waste Vault

The current total sum-of-fractions of the radionuclide limits for the Low Activity Waste Vault (LAWV)[8] is 0.295; considering only the primary isotopes of concern, the sum-of-fractions is 0.262. Table A5 shows the projected impact on the LAWV for the primary isotopes of concern. Neither the aquifer source node study nor the three-dimensional trench model will have any impact on the LAWV.

The impact of the less conservative air analysis[13] will only impact the ^{14}C limit, which will increase by about 50 times.

If the timing of dose study were implemented, the individual radionuclide limits would not increase. However, since the limits would be applied to specific radionuclides or to small groups of radionuclides, the sum-of-fractions would not encompass every radionuclide being disposed and the quantity of radionuclides that could be disposed would increase. The inventory that could be disposed for ^{99}Tc, and generic ^{129}I (i.e., waste which would exhibit a low K_d for ^{129}I) would increase by about 6.6 times. For the intruder-limited radionuclides (i.e., ^{233}U and ^{239}Pu), the inventory that could be disposed would increase by about 45 times. For ^{14}C, which is limited by the air pathway, the inventory that could be disposed would increase by about 18 times. And, for ^{234}U, which is limited by the radon pathway, the inventory that could be disposed would increase by about 32 times.

To estimate the aggregate effect of these potential changes, the projected impact of the various studies were used to adjust the PA limits. Table 9 shows the results.

Table 9 Estimated Aggregate Effects of Studies on Low Activity Waste Vault

Primary Isotopes of Concern	LAW Vault (Ci)	LAW Vault PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	Adjusted LAW Vault PA Limit (Ci)	Fraction of Adjusted PA Limit	Fraction of Adjusted PA Late Well Limit	Fraction of PA Agriculture Limit	Fraction of Adjusted PA Air Limit	Fraction of PA Radon Limit
I129 Generic	1.62E-04	1.2E-03			1.2E-03	0.135	0.135			
C14	1.54E-01	2.7E+00		5.0E+01	1.4E+02	0.001			0.001	
U234	3.71E+00	1.2E+02			1.2E+02	0.031				0.031
Tc99	1.00E-01	6.0E+00			6.0E+00	0.017	0.017			
U233	5.05E-01	4.5E+01			4.5E+01	0.011		0.011		
Pu239	1.95E+00	1.8E+02			1.8E+02	0.011		0.011		
					Sum-of-Fractions	**0.206**	**0.152**	**0.022**	**0.001**	**0.031**

For the LAWV, two of the primary isotopes of concern (i.e., ^{233}U and ^{239}Pu) are limited by the intruder-agriculture pathway, which is assessed at 5,000 years. For the LAWV, the intruder-resident scenario is assessed at 100 years following closure; the limit for ^{233}U is about 6 orders of magnitude greater than that for the agriculture scenario at 5,000 years. Thus, changing the time of compliance to 1,000 years would increase the ^{233}U limit by about 6 orders of magnitude. If the time of compliance were reduced to 1,000 years, the limit for ^{239}Pu would be determined by the groundwater pathway and would increase several orders of magnitude. However, changing the period over which institutional controls are assumed to prevent intrusion would not change the limits because of the long half-lives of the radionuclides.

The analysis of the air pathway for ^{14}C did not consider the time over which the ^{14}C would be released to the surface[1], thus changing the assumed time of compliance will not impact the ^{14}C limit. The analysis for the radon pathway assumed a failed vault at 10,000 years. The radon was assumed to be produced by radioactive decay for the 10,000-year period. Changing the time of compliance to 1,000 years would greatly impact the radon calculation. Not only would the amount of radon at 1,000 years be much less than that at 10,000 years, the LAWV would be intact and the release of radon to the disposal unit surface would also decrease. For ^{99}Tc and ^{129}I, which are limited by the groundwater pathway, the time of the peak groundwater concentration is greater than 1,000 years[1,14]. The peak groundwater concentration for ^{99}Tc is about 3,000 years and that for ^{129}I is about 1,600 years. At 1,000 years, the concentration of ^{129}I is about two percent of that at the peak. Therefore, the ^{129}I groundwater-based limit would increase by about a factor of 50. Changing the time of compliance would greatly increase the LAWV limits.

When the studies discussed above are implemented, the largest sum-of-fractions for the LAWV will be 0.152 for the late well groundwater limits. Even if the timing of doses study were not implemented, the sum-of-fractions of the adjusted limits would be only 0.206.

6.6 Intermediate Level Vault

The current total sum-of-fractions of the radionuclide limits for the Intermediate Level Vault (ILV)[8] is 0.325; considering only the primary isotopes of concern, the sum-of-fractions is 0.305. Table A6 shows the projected impact on the ILV for the primary isotopes of concern. The estimated impact of the aquifer source node study is that the radionuclide disposal limits for the groundwater pathway (i.e., the limits for ^{129}I on generic waste and on activated carbon) would decrease by about 2.2 times (i.e., if the aquifer source node study results were to be used to revise disposal limits, the revised limits would be about 45 percent of the current limits). For the ILV, another potential non-conservatism should also be considered. The foot-print (i.e., the area of the vault) of the ILV is smaller than the area of the groundwater cell into which the radionuclide flux is input. This results in an artificial dilution in the groundwater model. The area of the ILV is about 12,100 ft^2 and the area of the groundwater cell is 40,000 ft^2. The dilution factor, accounting for dispersion in the groundwater, is estimated to be 0.40. Therefore, the groundwater-derived limits should be multiplied by 0.40 to account for the artificial dilution[9].

There would be no change in the ILV limits due to the three-dimensional trench model study.

The impact of the less conservative air analysis[13] will only impact the ^{14}C limit, which will increase but the magnitude of the increase is uncertain.

If the timing of dose study were implemented, the individual radionuclide limits would not increase. However, since the limits would be applied to specific radionuclides or to small groups of radionuclides, the sum-of-fractions would not encompass every radionuclide being disposed and the quantity of radionuclides that could be disposed would increase. The inventory that could be disposed for ^{129}I, which is limited by the groundwater pathway, would increase by about 9 times. For ^{233}U and ^{238}U, which are limited by the intruder pathway, the inventory that could be disposed would increase by about 36 times. For ^{14}C, which is limited by the air pathway, the inventory that could be disposed would increase by about

6.6 times. And, for ^{234}U, which is limited by the radon pathway, the inventory that could be disposed would increase by about 62 times.

To estimate the aggregate effect of these potential changes, the projected impacts of the various studies were used to adjust the PA limits. Table 10 shows the results.

Table 10 Estimated Aggregate Effects of Studies on Intermediate Level Vault

Primary Isotopes of Concern	IL Vault (Ci)	IL Vault PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Artificial Dilution	Adjusted ILV PA Limits (Ci)	Fraction of Adjusted ILV PA Limits	Fraction of Adjusted PA Late Well Limit	Fraction of PA Resident Limit	Fraction of PA Air Limit	Fraction of PA Radon Limit
C14	4.08E-01	2.7E+00			2.7E+00	0.151			0.151	
I129 Generic	5.00E-05	5.2E-04	4.5E-01	4.0E-01	9.3E-05	0.541	0.541			
U233 Depleted	1.12E-01	7.0E+00			7.0E+00	0.016		0.016		
U234	2.37E-01	1.5E+01			1.5E+01	0.016				0.016
I129 Activated Carbon	1.99E-03	1.4E-01	4.5E-01	4.0E-01	2.5E-02	0.080	0.080			
U238	5.75E-01	4.9E+01			4.9E+01	0.012		0.012		
					Sum-of-Fractions	0.815	0.621	0.028	0.151	0.016

For the ILV, two of the primary isotopes of concern (i.e., ^{233}U and ^{238}U) are limited by the intruder-resident pathway, which is assessed at 100 years. Thus, changing the time of compliance to 1,000 years would not change the intruder-based limits. Because of the long half-lives of the uranium isotopes, increasing the institutional control period to 300 years would not change the limits.

The analysis of the air pathway for ^{14}C did not consider the time over which the ^{14}C would be released to the surface[1], thus changing the assumed time of compliance will not impact the ^{14}C limit. The analysis for the radon pathway assumed a failed vault at 10,000 years. The radon was assumed to be produced by radioactive decay for the 10,000-year period. Changing the time of compliance to 1,000 years would greatly impact the radon calculation. Not only would the amount of radon at 1,000 years be much less than that at 10,000 years, the ILV would be intact and the release of radon to the disposal unit surface would also decrease. For ^{129}I, both generic and on activated carbon, which are limited by the groundwater pathway, the time of the peak groundwater concentration is slightly greater than 1,000 years[1,20]. However, the shape of the peak is very sharp, being driven by the assumed failure of the vault at 1,000 years. The ^{129}I concentration at 1,000 years is about three orders of magnitude smaller than that at the peak. However, since the peak is at about 1050 years, it is not likely that changing the time of compliance to 1,000 years would result in changing the ^{129}I limit.

When the studies discussed above are implemented, the largest sum-of-fractions for the ILV will be 0.621 for the late well groundwater limits. If the timing of doses study were not implemented, the sum-of-fractions of the adjusted limits would be 0.815.

However, about 14% of the ^{129}I in the ILV, which is attributed to generic waste, is actually on resins generated from the K&L Disassembly Basin. The distribution coefficients, K_d, for ^{14}C, ^{99}Tc, and ^{129}I on these resins were studied[21]. The ^{129}I K_d on the K&L resins was estimated to be greater than 3700 mL/g. Using the equation that relates ^{129}I K_d to disposal limit for the ILV[20], and adjusting for the ^{129}I Maximum Contaminant Level being 1 pCi/L[22] instead of the 0.5 pCi/L value assumed in developing the equation, the ^{129}I disposal limit for the K&L resins would be 0.879. Table 11 shows the aggregate impact of all the studies, including implementing a wasteform-specific limit for ^{129}I on the K&L basin resins.

Table 11 Estimated Aggregate Effects of Studies on Intermediate Level Vault, including K&L Basin Resins

Primary Isotopes of Concern	IL Vault (Ci)	IL Vault PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Artificial Dilution	Adjusted ILV PA Limits (Ci)	Fraction of Adjusted ILV PA Limits	Fraction of Adjusted PA Late Well Limit	Fraction of PA Resident Limit	Fraction of PA Air Limit	Fraction of PA Radon Limit
C14	4.08E-01	2.7E+00			2.7E+00	0.151			0.151	
I129 Generic	4.28E-05	5.2E-04	4.5E-01	4.0E-01	9.3E-05	0.462	0.462			
I129 K&L Basin Resins	7.24E-06	8.8E-01	4.5E-01	4.0E-01	1.6E-01	0.00005	0.00005			
U233 Depleted	1.12E-01	7.0E+00			7.0E+00	0.016		0.016		
U234	2.37E-01	1.5E+01			1.5E+01	0.016				0.016
I129 Activated Carbon	1.99E-03	1.4E-01	4.5E-01	4.0E-01	2.5E-02	0.080	0.080			
U238	5.75E-01	4.9E+01			4.9E+01	0.012		0.012		
					Sum-of-Fractions	0.737	0.542	0.028	0.151	0.016

Implementing the wasteform-specific ^{129}I limit for the K&L basin resins would reduce the SOF for the late well limits to 0.542.

6.7 Naval Reactor Disposal Pad

The current total sum-of-fractions of the radionuclide limits for the Naval Reactor (NR) Pad[8] is 0.0932; considering only the primary isotopes of concern, the sum-of-fractions is 0.0867. Table A7 shows the projected impact on the NR disposal Pad for the primary isotope of concern, ^{14}C. The impact of the aquifer source node study is uncertain at this time; no impact will be assumed.

There will be no impact from the three-dimensional trench model study or the less conservative air analysis.

If the timing of dose study were implemented, the individual radionuclide limits would not increase. However, since the limits would be applied to specific radionuclides or to small groups of radionuclides, the sum-of-fractions would not encompass every radionuclide being disposed and the quantity of radionuclides that could be disposed would increase. For ^{14}C, which is limited by the groundwater pathway[23], the inventory that could be disposed would increase by about 12 times.

To estimate the aggregate effect of these potential changes, the projected impact of the various studies were used to adjust the PA limits. Table 12 shows the results.

Table 12 Estimated Aggregate Effects of Studies on NR Pad

Primary Isotopes of Concern	NR Disposal Pad (Ci)	NR Disposal Pad PA Limit (Ci)	Fraction of PA Limit
C14	6.68E+01	7.7E+02	0.087
		Sum-of-Fractions	**0.087**

For the NR Pad, the primary isotope of concern, ^{14}C, is limited by the groundwater pathway. The peak groundwater concentration occurs at 900 years. Therefore, changing the time of compliance to 1,000 years would not change the ^{14}C limit.

When the studies discussed above are implemented, the largest sum-of-fractions for the NR Pad will be 0.087.

7.0 Summary

Potential impacts of performance assessment studies have been considered for the seven disposal units in the ELLWF. Only one of the studies, the aquifer source node study, would result in radionuclide disposal limits being reduced. However, consideration of artificial dilution in the ILV groundwater model would also result in reduced ILV groundwater limits. Implementation of the aquifer source node study would increase the current sum-of-fractions of the radionuclide disposal limits in each disposal unit. However, implementation of the other studies will result in increased radionuclide disposal limits or increases in the inventories that could be disposed, mitigating the decrease in limits resulting from the aquifer source node study and, for the ILV, artificial dilution.

Results developed in the discussion of each of the disposal units (i.e., Tables 2-5 and 8-12) are summarized below in Table 13. Table 13 shows, for each disposal unit, the current (i.e., as of 4/16/03) percent of the disposal volume that is filled with waste, the current sum-of-fractions (SOF) of disposal limits for all radionuclides disposed, the current SOF for the primary isotopes of concern, the adjusted (i.e., including the estimated impact of the studies) SOF assuming that the timing of doses is not implemented, the largest adjusted SOF assuming that the timing of doses is implemented, and the major pathway and radionuclides that contribute to the largest SOF with timing of doses.

Table 13 Summary of Potential Effects of Studies

			Primary Isotopes of Concern			
Disposal Unit	Current Volume Percent Filled	Current Total SOF	Current SOF	No Timing of Dose Adjusted SOF	Timing of Dose Largest Adjusted SOF	Major Pathway & Nuclides for Timing of Dose
Slit #1	95.0	0.882	0.854	1.241	1.144	GW Early Well, ^{3}H
Slit #1 with 232-F rubble tritium limit	95.0	0.882	0.854	0.783	0.686	GW Early Well, ^{3}H generic & 232-F rubble
Slit #2	40.0	0.508	0.490	0.612	0.302	GW Late Well, ^{129}I F Filtercake, ^{238}U, ^{237}Np
ET #1	37.5	0.380	0.361	0.511	0.325	GW Early Well, ^{3}H, ^{99}Tc, ^{129}I
CIG*	10.0	0.021	0.018	0.008	0.008	GW Early Well, ^{129}I
LAWV	61.4	0.295	0.262	0.206	0.152	GW Late Well, ^{129}I, ^{99}Tc
ILV	42.9	0.325	0.305	0.815	0.621	GW Late Well, ^{129}I, ^{129}I Activated Carbon
ILV with K&L Basin Resin ^{129}I limit	42.9	0.325	0.305	0.737	0.542	GW Late Well, ^{129}I, ^{129}I Activated Carbon, ^{129}I K&L Basin Resins
NR Pad	13.0	0.093	0.087	0.087	0.087	GW ^{14}C

* Assuming limits derived in reference 19

If all the studies were implemented, the sum-of-fractions of the primary isotopes of concern for the early well limits for the first set of Slit Trenches would be 1.144. This is caused by tritium, most of which comes from rubble from 232-F. If a Special Analysis were also conducted to implement a wasteform-specific limit for tritium in 232-F rubble, the largest SOF of the primary isotopes of concern for the early well limits would decrease to about 0.686. If all the studies, including developing a wasteform specific tritium limit for the 232-F rubble were implemented, the total SOF of all radionuclides for the early well limits is projected to be 0.708 instead of the current 0.882.

For the other disposal units, Table 13 shows that only the ILV has the potential for significant (i.e., 10 percent or greater) increase in the largest SOF after all the studies have been implemented. For the ILV, the SOF for the primary isotopes of concern would increase from 0.305 to 0.621, a relative increase of 104%. However, if a wasteform-specific limit for ^{129}I on the K&L basin resins is assumed, the largest SOF would be 0.542.

Tests were conducted to determine the effect of adding additional radionuclides to each of the disposal units. For each unit, a spreadsheet in the same format as the tables in Section 6 was used to determine how many curies of a particular radionuclide or group of radionuclides could be added, assuming the unit is managed to a particular Sum-of-Fractions (i.e., a target SOF) using the current radionuclide disposal limits. Table 14 shows the target Sums-of-Fractions for each of the disposal units. The additional curies were then added to the curies of that radionuclide, or distribution of radionuclides, and the resulting Sums-of-Fractions were determined, assuming the studies discussed herein are implemented. Results of each test for each disposal unit are shown in Appendix B.

Table 14 Current Target Sums-of-Fractions

Disposal Unit	Target SOF
Slit Trench # 1	0.90
Slit Trench # 2	0.85
Engineered Trench # 1	0.90
Component-In-Grout Trench	0.95
Low Activity Waste Vault	1.00
Intermediate Level Vault	0.95
Naval Reactor Disposal Pad	1.00

Summaries of the results of the testing are shown in Tables 15 through 21 and are discussed below.

Table 15 Slit Trench #1, including 232-F Rubble Summary

Target SOF	Additional Ci	Early Well SOF	Late Well SOF	Air SOF
0.900	None	0.686	0.097	0.0005
0.900	Same Distribution	0.708	0.100	0.0005
0.900	Only Early Well	0.712	0.097	0.0005
0.900	Only ^{3}H generic	0.712	0.097	0.0005
0.900	Only ^{3}H 232-F Rubble	0.712	0.097	0.0005
0.900	Only ^{129}I generic	0.712	0.097	0.0005
0.900	Only Late Well	0.686	0.124	0.0005
0.900	Only ^{238}U	0.686	0.124	0.0005
0.900	Only ^{14}C	0.686	0.097	0.0008

For the first set of Slit Trenches, Table 15 shows that, assuming that a wasteform-specific disposal limit for tritium in 232-F rubble is implemented, adding radionuclides with the same distribution as that currently in the unit versus a target SOF of 0.900 and versus the current disposal limits will result in the SOF for early well radionuclides increasing to 0.708, the late well SOF increasing to 0.100, and the air SOF remaining unchanged at 0.0005 when all the studies discussed in this report are implemented. If all the additional curies are added equally distributed among the early well radionuclides (i.e. generic ^{3}H, ^{3}H on 232-F rubble, generic ^{129}I) or all as only one of the early well radionuclides, the early well SOF increases to 0.712 and the late well SOF and air SOF are unchanged from the base case (i.e., no additional radionuclides). If the additional radionuclides are added equally distributed among the late well radionuclides (i.e., ^{129}I on F-Area Filtercake, ^{237}Np, ^{238}U) or all as one of the late well radionuclides, the late well SOF increases to 0.124 and the other SOFs remain the same as in the base case. If the additional radionuclides are added as ^{14}C, which is limited by the air pathway, the air SOF increases to 0.0008 and the other SOFs remain unchanged. These results indicate that, so long as a wasteform-specific limit for tritium in concrete rubble is implemented along with the other studies, placing additional waste in the first set of Slit Trenches according to the current limits and the current target SOF of 0.900 will be protective, regardless of the distribution of the added radionuclides. Thus, no interim measures are needed for the first set of Slit Trenches.

For the second set of Slit Trenches, Table 16 shows the results of the tests. If all the additional curies of radionuclides are added with the same distribution of radionuclides as currently disposed, the early well SOF increases to 0.338, the late well SOF increases to 0.514, the resident SOF increases to 0.089, the air SOF increases to 0.0015, and the radon SOF increases to 0.097. If all the additional curies are added equally distributed among the early well radionuclides (i.e. ^{3}H, ^{99}Tc, generic ^{129}I) or all as one of the early well radionuclides, the early well SOF increases to 0.709 and the other SOFs are unchanged from the base case (i.e., no additional radionuclides). If the additional radionuclides are added equally distributed among the late well radionuclides (i.e., ^{129}I on F-Area Filtercake, ^{238}U, ^{237}Np, ^{129}I on F-Area CG-8, ^{234}U, ^{129}I on F-WTU Dowex 21K, ^{233}U) or all as one of the late well radionuclides, the late well SOF increases to 0.813 and the other SOFs remain the same as in the base case. If the additional curies are added as ^{238}U in M-Area Glass, which is limited by the intruder resident scenario, the resident SOF increases to 0.395 and the other SOFs are unchanged. If the additional radionuclides are added as ^{14}C, which is limited by the air pathway, the air SOF increases to 0.0077 and the other SOFs remain unchanged. If the additional curies are added as ^{234}U in M-Area Glass, which is limited by the radon pathway, the radon SOF increases to 0.399 and the other SOFs are unchanged. These results show that adding additional radionuclides to the second set of Slit Trenches, in accordance with the current radionuclide disposal limits and the current target SOF of 0.850, regardless of the distribution of the radionuclides, the target SOF will not be exceeded after all the studies are implemented. Thus, no interim measures are needed for the second set of Slit Trenches.

Table 16 Slit Trench #2, Summary

Target SOF	Additional Ci	Early Well SOF	Late Well SOF	Resident SOF	Air SOF	Radon SOF
0.850	None	0.199	0.302	0.053	0.0009	0.057
0.850	Same Distribution	0.338	0.514	0.089	0.0015	0.097
0.850	Only Early Well	0.709	0.302	0.053	0.0009	0.057
0.850	Only ^{3}H	0.709	0.302	0.053	0.0009	0.057
0.850	Only Late Well	0.199	0.813	0.053	0.0009	0.057
0.850	Only ^{238}U in M-Area Glass	0.199	0.302	0.395	0.0009	0.057
0.850	Only ^{14}C	0.199	0.302	0.053	0.0077	0.057
0.850	Only ^{234}U in M-Area Glass	0.199	0.302	0.053	0.0009	0.399

For the Engineered Trench, Table 17 shows the results of the tests. The results show that the current target SOF of 0.900 will not be exceeded after all the studies are implemented if additional radionuclides with the same distribution as those currently disposed are added using the current disposal limits and the current target SOF of 0.900. If the additional curies are added as only early well radionuclides, the early well SOF will exceed 1.0. If the additional curies are added as late well radionuclides, the late well SOF will exceed the current target SOF. Therefore, if the distribution of radionuclides in future waste is assumed to be the same as that currently disposed (i.e., as of 4/16/2003), no interim measures are needed for the ET. However, if the distribution of radionuclides in future waste is uncertain, the target SOF should be reduced to 0.765 to ensure that, after all the studies are implemented, the SOF does not exceed 0.900.

Table 17 Engineered Trench #1, Summary

Target SOF	Additional Ci	Early Well SOF	Late Well SOF	Air SOF
0.900	None	0.325	0.185	0.0004
0.900	Same Distribution	0.794	0.453	0.0009
0.900	Only ^{14}C	0.325	0.185	0.0108
0.900	Only Early Well	1.101	0.185	0.0004
0.900	Only ^{3}H	1.101	0.185	0.0004
0.900	Only ^{129}I generic	1.101	0.185	0.0004
0.900	Only ^{99}Tc	1.101	0.185	0.0004
0.800	Only ^{3}H	0.952	0.185	0.0004
0.700	Only ^{3}H	0.803	0.185	0.0004
0.750	Only ^{3}H	0.877	0.185	0.0004
0.770	Only ^{3}H	0.907	0.185	0.0004
0.760	Only ^{3}H	0.892	0.185	0.0004
0.765	Only ^{3}H	0.900	0.185	0.0004
0.900	Only Late Well	0.325	0.961	0.0004
0.900	Only ^{233}U	0.325	0.961	0.0004
0.900	Only ^{237}Np	0.325	0.961	0.0004
0.900	Only ^{234}U	0.325	0.961	0.0004
0.900	Only ^{238}U	0.325	0.961	0.0004
0.900	Only ^{129}I F-Area Filtercake	0.325	0.961	0.0004
0.900	Only ^{90}Sr	0.325	0.961	0.0004
0.800	Only ^{233}U	0.325	0.812	0.0004
0.850	Only ^{233}U	0.325	0.887	0.0004
0.870	Only ^{233}U	0.325	0.917	0.0004
0.865	Only ^{233}U	0.325	0.909	0.0004
0.862	Only ^{233}U	0.325	0.905	0.0004
0.861	Only ^{233}U	0.325	0.903	0.0004
0.860	Only ^{233}U	0.325	0.902	0.0004
0.859	Only ^{233}U	0.325	0.900	0.0004
0.858	Only ^{233}U	0.325	0.899	0.0004

For the Component-In-Grout Trench, Table 18 summarizes the results. If all the available curies are added as early well radionuclides, the largest SOF is 0.937, which is less than the target SOF of 0.95. If all the available curies are added as late well radionuclides, the largest SOF is also 0.937. Thus, no interim measures are needed for the Component-In-Grout Trench.

Table 18 Component-In-Grout Trench, using Revised Limits Summary

Target SOF	Additional Ci	Early Well SOF	Late Well SOF	Resident SOF
0.950	None	0.008	0.008	0.00091
0.950	Same Distribution	0.452	0.440	0.05330
0.950	Only ^{129}I	0.937	0.008	0.00091
0.950	Only Early Well	0.937	0.008	0.00091
0.950	Only Late Well	0.008	0.937	0.00091

For the Low Activity Waste Vault, Table 19 summarizes the results. Even if all the curies are added as late well radionuclides, the largest SOF is 0.857, which is less than the target SOF of 1.0. Thus no interim measures are needed for the LAWV.

Table 19 Low Activity Waste Vault, Summary

Target SOF	Additional Ci	Late Well SOF	Agriculture SOF	Air SOF	Radon SOF
1.000	None	0.152	0.022	0.001	0.031
1.000	Same Distribution	0.561	0.081	0.004	0.114
1.000	Only ^{129}I	0.857	0.022	0.001	0.031

For the Intermediate Level Vault, Table 20 summarized the results. If the additional radionuclides are added per the same distribution as that currently disposed or as only late well radionuclides (e.g., ^{129}I), the SOF will exceed 0.95 when all the studies are implemented. If future disposals are assumed to have the same radionuclide distribution as that currently disposed, reducing the target SOF to 0.544 will ensure that the SOF when all the studies have been implemented will not exceed 0.950. Reducing the target SOF to 0.397 will ensure that the SOF when all the studies are implemented will not exceed 0.950, regardless of the radionuclide distribution in future waste disposals.

Table 20 Intermediate Level Vault, Including K&L Resins Summary

Target SOF	Additional Ci	Late Well SOF	Resident SOF	Air SOF	Radon SOF
0.950	None	0.542	0.028	0.151	0.016
0.950	Same Distribution	1.706	0.087	0.476	0.050
0.950	Only ^{129}I	4.054	0.028	0.151	0.016
0.500	Same Distribution	0.868	0.044	0.242	0.025
0.700	Same Distribution	1.240	0.063	0.346	0.036
0.600	Same Distribution	1.054	0.054	0.294	0.031
0.550	Same Distribution	0.961	0.049	0.268	0.028
0.540	Same Distribution	0.942	0.048	0.263	0.027
0.545	Same Distribution	0.952	0.049	0.265	0.028
0.543	Same Distribution	0.948	0.048	0.264	0.028
0.544	Same Distribution	0.950	0.049	0.265	0.028
0.500	Only ^{129}I Generic	1.525	0.028	0.151	0.016
0.400	Only ^{129}I Generic	0.963	0.028	0.151	0.016
0.350	Only ^{129}I Generic	0.682	0.028	0.151	0.016
0.390	Only ^{129}I Generic	0.907	0.028	0.151	0.016
0.395	Only ^{129}I Generic	0.935	0.028	0.151	0.016
0.397	Only ^{129}I Generic	0.947	0.028	0.151	0.016
0.398	Only ^{129}I Generic	0.952	0.028	0.151	0.016

Thus, interim measures are needed for the ILV. Either the target SOF should be reduced to 0.544, assuming the radionuclide distribution in future waste remains the same as that already disposed, or to 0.397, assuming the radionuclide distribution in future waste is unknown.

Table 21 summarizes the results for the Naval Reactor Pad. Adding additional radionuclides per the current disposal limits and the current target SOF of 1.0, even if the additional curies are all ^{14}C, will not result in exceeding the target SOF of 1.0 after all the studies have been implemented. Thus, no interim measures are needed for the Naval Reactor Pad.

Table 21 Naval Reactor Pad, Summary

Target SOF	Additional Ci	PA Limit SOF
1.000	None	0.087
1.000	Only ^{14}C	0.994

8.0 Conclusions

Implementing the aquifer source node and the ILV artificial dilution studies will require a Special Analysis to revise and re-run the slit trench and ILV models for all the relevant radionuclides and to develop a model specifically for the engineered trench. This work may take about a year to complete. The less conservative air Special Analysis and the timing of dose Special Analysis are expected to be complete this fiscal year (i.e., by 9/30/03). Since it may take as long as a year to implement all the studies considered in this report, interim measures should be implemented to ensure that target SOFs are not exceeded when all the SAs are complete.

Two types of interim measure could be used. The first would be to manage the disposal units to a reduced target SOF. The results in Section 7.0 show that no interim measures are needed for the first and second set of Slit Trenches, for the CIG trench, for the LAWV, and for the NR pad, regardless of the distribution of radionuclides in future disposals. For the ET, if the distribution of radionuclides in future waste is the same as that already disposed, no interim measures are needed. However if the distribution of radionuclides in future disposals in the ET is uncertain, the target SOF should be reduced to 0.76. For the ILV, managing to a target SOF of 0.39 will ensure that the late well SOF will not exceed 0.95, regardless of the distribution of radionuclides in future waste. If the radionuclide distribution in waste to be disposed in the ILV is expected to be the same as that already disposed, the SOF need only be reduced to 0.54.

The second type of interim measure would be to alter the administrative controls in the Waste Information Tracking System (WITS) to account for the potential reduction in groundwater-based limits. The interim administrative control would be developed by multiplying the current groundwater-based radionuclide disposal limits by the factors developed in this report (e.g., 0.67 for the ET and 0.18 for the ILV) and then comparing the adjusted limits with the limits derived for the other pathways to determine which pathway is limiting. Tables 22 and 23 show interim administrative controls for the ET and the ILV. This type of interim measure does not account for the benefit expected from implementing the timing of doses and would, therefore, be more conservative.

For the new Slit Trenches and Engineered Trench that may begin receiving waste prior to relinquishing these interim measures, the first type of interim measure would be implemented by managing to a target SOF of 0.60 (i.e., 0.90 times 0.67) for ET#2 and to 0.63 (i.e., 0.95 times 0.67) for Slit #3 and Slit #4. The second type of interim measure would be implemented as described above. For the new units, neither type of interim measure would account for the benefit expected from implementing the timing of doses.

9.0 Recommendations

Four recommendations arise from this study. They are:

1. Interim measures should be imposed as soon as possible on the ET and ILV. Either the target sum-of-fractions of the current disposal limits should be reduced to 0.76 for the ET and to 0.39 for the ILV, assuming that the radionuclide distribution in future waste is uncertain, or to 0.54 for the ILV, assuming that the radionuclide distribution in future waste will be like that already disposed or the administrative controls in WITS should be revised by adjusting the groundwater-based limits according to the factors employed in this study, as outlined above. If new Slit Trenches or a new Engineered Trench are opened prior to relinquishing these interim measures, they may either be managed to an SOF of 0.60 for ET#2 and to 0.63 for Slit #3 and Slit #4 or the WITS administrative controls should be altered as discussed above. Implementation of either type of interim measure will achieve the desired result.
2. A Special Analysis should be completed as soon as possible to develop a wasteform-specific ILV disposal limit for ^{129}I on K&L Basin resins. If possible, this SA should also develop limits for ^{14}C and ^{99}Tc on the K&L resins. This SA is currently scheduled for August 2003.
3. A Special Analysis should be completed to develop a tritium limit for concrete rubble to account for the lower leach rate for concrete rubble compared to generic waste.
4. The studies considered herein should be completed and implemented as soon as possible. This will involve completing five special analyses (SA). One for the timing of doses, one to recalculate groundwater limits for the Slit Trenches, one to develop a groundwater model explicitly for the engineered trench and use it to calculate groundwater limits for the ET, one to revise the ILV groundwater model to account for optimizing the source nodes and reducing artificial dilution and use it to recalculate groundwater limits and one to revise the ^{14}C limit for the air pathway. The timing of doses SA is scheduled to be completed at the end of FY03. The other SAs should be scheduled for FY04. WAC limits should not be revised to incorporate the new limits until all the studies have been completed. At that time, interim measures can be lifted.

Table 22 Engineered Trench Interim Administrative Controls

Nuclide	Administrative Control (Ci)
H-3	4.2E+00
C-14	2.7E+00
Co-60	7.3E+08
Ni-59	9.9E+01
Ni-63	2.8E+05
Se-79	7.9E+01
Rb-87	2.3E-01
Sr-90	3.4E+02
Zr-93	1.8E+01
Tc-99	4.1E-01
Pd-107	3.0E+01
Cd-113m	2.4E+04
Sn121m	1.2E+06
Sn-126	2.7E+01
I-129 - generic	7.0E-04
F-Area CG-8	2.2E-03
H-Area CG-8	1.6E-02
F-Area Filtercake	2.2E-03
H-Area Filtercake	2.7E-02
F-WTU Dowex 21K	2.8E-01
ETF GT-73	4.1E-01
H-Area Dowex 21K	6.7E-01
H-Area Carbon	2.8E+00
F-Area Carbon	6.7E+00
Cs-135	1.1E+01
Cs-137	2.1E+04
Sm151	6.1E+06
Eu-154	8.1E+06

Nuclide	Administrative Control (Ci)
Th-232	1.4E+00
U-232	3.9E+01
U-233	1.3E+00
U-234	7.6E+00
U-235	5.3E+00
U-236	1.4E+00
U-238	5.0E+00
Np-237	3.2E-02
Pu-238	9.2E+03
Pu-239	5.7E-01
Pu-240	7.2E-01
Pu-241	4.8E+03
Pu-242	1.0E-02
Pu-244	1.1E-02
Am-241	1.6E+02
Am-242m	8.1E+02
Am-243	5.5E-01
Cm-242	1.1E+05
Cm-243	1.8E+04
Cm-244	2.6E+02
Cm-245	2.7E+01
Cm-246	1.4E+02
Cm-247	4.4E-01
Cm-248	3.6E+01
Bk-249	2.8E+04
Cf-249	6.9E+01
Cf-250	4.8E+04
Cf-251	5.2E+01
Cf-252	4.5E+06

Table 23 Intermediate Level Vault Interim Administrative Controls

Nuclide	Administrative Control (Ci)
H-3	5.5E+07
C-14	2.7E+00
Ni-59	5.4E+01
Co-60	6.3E+08
Se-79	5.3E+00
Sr-90	3.3E+09
Zr-93	1.8E+05
Tc-99	4.5E+00
Sn-126	7.5E-01
I-129 - generic	9.3E-05
Activated Carbon	2.6E-02
Cs-135	2.2E+01
Cs-137	6.5E+05
Eu-154	1.1E+07
Th-232	4.1E-01
U-232	9.4E+02
U-233	7.0E+00
U-234	1.5E+01
U-235	6.0E+00
U-236	3.1E+04
U-238	4.9E+01
Np-237	6.0E+00
Pu-238	4.0E+09
Pu-239	2.9E+04
Pu-240	1.3E+05
Pu-241	8.9E+05
Pu-242	5.2E+04
Pu-244	3.1E+00
Am-241	3.0E+04
Am-242m	2.7E+07
Am-243	1.9E+01
Cm-244	4.6E+07
Cm-245	3.8E+01
Cm-246	2.4E+05
Cm-247	3.4E+00
Cm-248	8.1E+02
Cf-249	8.9E+02
Cf-251	2.7E+04
Cf-252	1.0E+10

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11.0 APPENDIX A

POTENTIAL IMPACT OF STUDIES ON ELLWF DISPOSAL UNIT LIMITS AND INVENTORIES

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Table A1 Impact on Slit Trench #1 for Primary Isotopes of Concern(1)

Study	GW Pathway	(2)	Intruder Pathway	(2)	Air Pathway	(2)	Radon Pathway	(2)
Aquifer Source Node	H3 I129 F-Area Filtercake Np237 I129 Generic U238	(0.67x) (0.67x) (0.67x) (0.67x) (0.67x)		?	C14	?		?
Timing of Doses (3)	H3 I129 F-Area Filtercake Np237 I129 Generic U238	(1.3x) (15x) (15x) (1.3x) (15x)		?	C14	(44x)		?
3D Trench Model	H3 I129 F-Area Filtercake Np237 I129 Generic U238	(?) (?) (?) (?) (?)		?	C14	?		?
Less Conservative Air Analysis	H3 I129 F-Area Filtercake Np237 I129 Generic U238	? ? ? ? ?		?	C14	(50x)		?

(1) Primary isotopes of concern include those representing >1% of the disposal limit as of 4/16/03

(2) The following notation is used in communicating the projected impact of the subject study on the current disposal unit inventory limit: (#x) - Multiple or fraction of limit. Where the multiple or fraction is uncertain the uncertainty is denoted by the ~ sign. (?) - Increase in limit, magnitude of change unknown. (?) - decrease in limit, magnitude of change unknown. (?) - No impact on limit. (?) – Impact on limit unknown.

(3) For timing of doses, the inventory limit is not changed, but the sum-of-fractions of the limit is changed, since the limit for each radionuclide is considered separately depending on the timing of the impact or the pathway. The entry in the table refers to the impact on the amount of the radionuclide that could be disposed if the timing of doses were implemented.

Note: The footnotes are the same for all of the Appendix A tables; they are not repeated for subsequent tables.

Table A2 Impact on Slit Trench #2 for Primary Isotopes of Concern[1]

Study	GW Pathway	(2)	Intruder Pathway	(2)	Air Pathway	(2)	Radon Pathway	(2)
Aquifer Source Node	H3	(0.67x)	U238 M -Area Glass	?	C14	?	U234 M -Area Glass	?
	I129 F-Area Filtercake	(0.67x)						
	U238	(0.67x)						
	Np237	(0.67x)						
	Tc99	(0.67x)						
	I129 F-Area CG8	(0.67x)						
	I129 Generic	(0.67x)						
	U234	(0.67x)						
	I129 F-Area Dowex 21K	(0.67x)						
	U233	(0.67x)						
Timing of Doses [3]	H3	(7.5x)	U238 M -Area Glass	(19x)	C14	(23x)	U234 M -Area Glass	(18x)
	I129 F-Area Filtercake	(4.9x)						
	U238	(4.9x)						
	Np237	(4.9x)						
	Tc99	(7.5x)						
	I129 F-Area CG8	(4.9x)						
	I129 Generic	(7.5x)						
	U234	(4.9x)						
	I129 F-Area Dowex 21K	(4.9x)						
	U233	(4.9x)						
3D Trench Model	H3	?	U238 M -Area Glass	?	C14	?	U234 M -Area Glass	?
	I129 F-Area Filtercake	?						
	U238	?						
	Np237	?						
	Tc99	?						
	I129 F-Area CG8	?						
	I129 Generic	?						
	U234	?						
	I129 F-Area Dowex 21K	?						
	U233	?						
Less Conservative Air Analysis	H3	?	U238 M -Area Glass	?	C14	(50x)	U234 M -Area Glass	?
	I129 F-Area Filtercake	?						
	U238	?						
	Np237	?						
	Tc99	?						
	I129 F-Area CG8	?						
	I129 Generic	?						
	U234	?						
	I129 F-Area Dowex 21K	?						
	U233	?						

Table A3 Impact on Engineered Trench #1 for Primary Isotopes of Concern[1]

Study	GW Pathway	(2)	Intruder Pathway	(2)	Air Pathway	(2)	Radon Pathway	(2)
Aquifer Source Node	H3	(~0.67x)		?	C14	?		?
	U233	(~0.67x)						
	I129 Generic	(~0.67x)						
	Np237	(~0.67x)						
	Tc99	(~0.67x)						
	U234	(~0.67x)						
	U238	(~0.67x)						
	I129 F-Area Filtercake	(~0.67x)						
	Sr90	(~0.67x)						
Timing of Doses [3]	H3	(4.6x)			C14	(53x)		
	U233	(8.1x)						
	I129 Generic	(4.6x)						
	Np237	(8.1x)						
	Tc99	(4.6x)						
	U234	(8.1x)						
	U238	(8.1x)						
	I129 F-Area Filtercake	(8.1x)						
	Sr90	(8.1x)						
3D Trench Model	H3	?		?	C14	?		?
	U233	?						
	I129 Generic	?						
	Np237	?						
	Tc99	?						
	U234	?						
	U238	?						
	I129 F-Area Filtercake	?						
	Sr90	?						
Less Conservative Air Analysis	H3	?		?	C14	(50x)		?
	U233	?						
	I129 Generic	?						
	Np237	?						
	Tc99	?						
	U234	?						
	U238	?						
	I129 F-Area Filtercake	?						
	Sr90	?						

Table A4 Impact on the Component-In-Grout Trench for Primary Isotopes of Concern [1]								
Study	**GW Pathway**	**(2)**	**Intruder Pathway**	**(2)**	**Air Pathway**	**(2)**	**Radon Pathway**	**(2)**
Aquifer Source Node	I129	?		?	C14	?		?
Timing of Doses [3]	I129	(100x)		?	C14	(125x)		?
3D Trench Model	I129	?		?	C14	?		?
Less Conservative Air Analysis	I129	?		?	C14	(50x)		?

Table A5 Impact on the Low Activity Waste Vault for Primary Isotopes of Concern [1]								
Study	**GW Pathway**	**(2)**	**Intruder Pathway**	**(2)**	**Air Pathway**	**(2)**	**Radon Pathway**	**(2)**
Aquifer Source Node	I129 Generic Tc99	? ?	U233 Pu239	? ?	C14	?	U234	?
Timing of Doses [3]	I129 Generic Tc99	(6.6x) (6.6x)	U233 Pu239	(45x) (45x)	C14	(18x)	U234	(32x)
3D Trench Model	I129 Generic Tc99	? ?	U233 Pu239	? ?	C14	?	U234	?
Less Conservative Air Analysis	I129 Generic Tc99	? ?	U233 Pu239	? ?	C14	(50x)	U234	?

Table A6 Impact on the Intermediate Level Vault for Primary Isotopes of Concern[1]

Study	GW Pathway	(2)	Intruder Pathway	(2)	Air Pathway	(2)	Radon Pathway	(2)
Aquifer Source Node	I129 Generic I129 Activated Carbon	(0.45x) (0.45x)	U233 U238	? ?	C14	?	U234	?
Artificial Dilution	I129 Generic I129 Activated Carbon	(0.40x) (0.40x)	U233 U238	? ?	C14	?	U234	?
Timing of Doses [3]	I129 Generic I129 Activated Carbon	(9x) (9x)	U233 U238	(36x) (36x)	C14	(6.6x)	U234	(62x)
3D Trench Model	I129 Generic I129 Activated Carbon	? ?	U233 U238	? ?	C14	?	U234	?
Less Conservative Air Analysis	I129 Generic I129 Activated Carbon	? ?	U233 U238	? ?	C14	?	U234	?

Table A7 Impact on the Naval Reactor Disposal Pad for Primary Isotopes of Concern[1]

Study	GW Pathway	(2)	Intruder Pathway	(2)	Air Pathway	(2)	Radon Pathway	(2)
Aquifer Source Node	C14	?						
Timing of Doses [3]	C14	(12x)						
3D Trench Model	C14	?						
Less Conservative Air Analysis	C14	?						

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12.0 APPENDIX B

RESULTS OF ASSUMING ADDITIONAL RADIONUCLIDES ARE ADDED TO EACH DISPOSAL UNIT

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Method of Projecting Impacts from Disposal of Additional Radionuclides

The tables used to portray the effects of the studies (i.e., Tables 2 – 5 and Tables 8 – 12) were used as spreadsheets to forecast the impacts of disposing of additional radionuclides. The current radionuclide inventory was copied and pasted in a column to the left of the Primary Isotopes of Concern column to serve as a check on the inventory in the column to the right of the Primary Isotopes of Concern column. The current (i.e., as of 4/16/03) total SOF (i.e., the SOF for all radionuclides disposed, not just the Primary Isotopes of Concern) and the target SOF (i.e., the SOF to which the disposal unit is being managed or will be managed) were inserted below the table. In some cases the current target SOF was used and in others a presumed reduced target SOF was used. The target SOF was subtracted from the current total SOF to determine the remaining SOF. The remaining SOF is the fraction of disposal limits that remains to be added without exceeding the target SOF.

To determine the curies of additional radionuclides that could be added, assuming the distribution of the added radionuclides would be the same as that already disposed, the following method was used (e.g., for the first set of slit trenches, see Table B2). The current fraction of the current disposal limits for each of the Primary Isotopes of Concern was determined by dividing the current inventory of each radionuclide by the current inventory limit. The sum-of-fractions of the limits was determined to be 0.547. Then, for each of the Primary Isotopes of Concern, the relative fraction of the SOF contributed by each radionuclide was determined by dividing the fraction of the limit by the SOF. These fractions of the SOF are tabulated in the column denoted “Fract SOF”. Then, the portion of the remaining SOF that could be added for each radionuclide was determined by multiplying the remaining SOF (i.e., 0.018) by the fraction of the SOF for each radionuclide. These values are tabulated in the column denoted “Add Fract”. The number of curies of each radionuclide that could be added is then determined by multiplying the additional fraction by the current limit. The resulting additional curie quantities are tabulated in the column labeled “Add Ci”. The total curies of each radionuclide is then determined by adding the additional curies to the current inventory. The resulting total curies are tabulated in the column labeled “New Total Ci”. The new total curies for each radionuclide is then pasted into the “Slit Trench #1 (Ci)” column in the table.

The spreadsheet then determines the projected SOF for the various groupings of radionuclides (e.g., early well, late well) resulting from disposal of the added radionuclides.

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Table B1 Slit Trench #1, inc luding 232-F Rubble Tritium Limit, no additional radionuclides

Test Case Base Case

Table 3 Estimated Aggregate Effects of Studies On Slit Trench #1, including 232-F rubble tritium limit

	Primary Isotopes Of Concern	**Slit Trench #1 (Ci)**	**Slit Trenches PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**232-F Tritium Limit**	**Adjusted Slit Trenches PA Limit (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Air Limits**
8.42E-01	^{3}H, generic	8.42E-01	6.3E+00	6.70E-01			4.2E+00	0.199	0.199		
3.87E+00	^{3}H, 232-F Rubble	3.87E+00		6.70E-01		1.26E+01	8.4E+00	0.458	0.458		
8.14E-05	^{129}I F Area Filtercake	8.14E-05	3.2E-03	6.70E-01			2.1E-03	0.038		0.038	
1.09E-03	^{237}Np	1.09E-03	4.8E-02	6.70E-01			3.2E-02	0.034		0.034	
6.09E-02	^{14}C	6.09E-02	2.7E+00		5.00E+01		1.4E+02	0.0005			0.0005
1.87E-05	^{129}I Generic	1.87E-05	1.0E-03	6.70E-01			6.7E-04	0.028	0.028		
1.24E-01	^{238}U	1.24E-01	7.4E+00	6.70E-01			5.0E+00	0.025		0.025	
							Sum-of-Fraction	0.783	0.686	0.097	0.0005

		Nuclide	Current Ci	Current Limit
Current Total SOF:	8.82E-01			
Current Target SOF:	9.00E-01	3H, generic	8.42E-01	6.30E+00
Remaining SOF:	1.80E-02	3H, 232-F Rubble	3.87E+00	1.26E+01
		129I F Area Filtercake	8.14E-05	3.20E-03
		237Np	1.09E-03	4.80E-02
		14C	6.09E-02	2.70E+00
		129I Generic	1.87E-05	1.00E-03
		238U	1.24E-01	7.40E+00

Table B2 Slit Trench #1, including 232-F Rubble Tritium Limit, additional radionuclides have same distribution as those already disposed

Test Case Same Distribution

Table 3 Estimated Aggregate Effects of Studies On Slit Trench #1, including 232-F rubble tritium limit

	Primary Isotopes Of Concern	Slit Trench #1 (Ci)	Slit Trenches PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	232-F Tritium Limit	Adjusted Slit Trenches PA Limit (Ci)	Fraction of Adjusted PA Limits	Fraction of Adjusted PA Early Well Limits	Fraction of Adjusted PA Late Well Limits	Fraction of Adjusted PA Air Limits
8.42E-01	^{3}H, generic	8.70E-01	6.3E+00	6.70E-01			4.2E+00	0.206	0.206		
3.87E+00	^{3}H, 232-F Rubble	4.00E+00		6.70E-01		1.26E+01	8.4E+00	0.473	0.473		
8.14E-05	^{129}I F Area Filtercake	8.41E-05	3.2E-03	6.70E-01			2.1E-03	0.039		0.039	
1.09E-03	^{237}Np	1.12E-03	4.8E-02	6.70E-01			3.2E-02	0.035		0.035	
6.09E-02	^{14}C	6.29E-02	2.7E+00		5.00E+01		1.4E+02	0.0005			0.0005
1.87E-05	^{129}I Generic	1.94E-05	1.0E-03	6.70E-01			6.7E-04	0.029	0.029		
1.24E-01	^{238}U	1.28E-01	7.4E+00	6.70E-01			5.0E+00	0.026		0.026	
							Sum-of-Fraction	0.809	0.708	0.100	0.0005

Current Total SOF:	8.82E-01	Nuclide	Current Ci	Current Limit	Limit Fract	Fract SOF	Add Fract	Add Ci	New Total Ci
Current Target SOF:	9.00E-01	3H, generic	8.42E-01	6.30E+00	1.34E-01	2.44E-01	4.40E-03	2.77E-02	8.70E-01
Remaining SOF:	1.80E-02	3H, 232-F Rubble	3.87E+00	1.26E+01	3.07E-01	5.62E-01	1.01E-02	1.27E-01	4.00E+00
		129I F Area Filtercake	8.14E-05	3.20E-03	2.55E-02	4.66E-02	8.38E-04	2.68E-06	8.41E-05
		237Np	1.09E-03	4.80E-02	2.26E-02	4.14E-02	7.45E-04	3.58E-05	1.12E-03
		14C	6.09E-02	2.70E+00	2.25E-02	4.12E-02	7.42E-04	2.00E-03	6.29E-02
		129I Generic	1.87E-05	1.00E-03	1.87E-02	3.43E-02	6.17E-04	6.17E-07	1.94E-05
		238U	1.24E-01	7.40E+00	1.67E-02	3.06E-02	5.50E-04	4.07E-03	1.28E-01
				SOF	5.47E-01	1.00E+00	1.80E-02		

Table B3 Slit Trench #1, including 232-F Rubble Tritium Limit, additional radionuclides are only early well radionuclides

Test Case Add only Early Well

Table 3 Estimated Aggregate Effects of Studies On Slit Trench #1, including 232-F rubble tritium limit

	Primary Isotopes Of Concern	Slit Trench #1 (Ci)	Slit Trenches PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	232-F Tritium Limit	Adjusted Slit Trenches PA Limit (Ci)	Fraction of Adjusted PA Limits	Fraction of Adjusted PA Early Well Limits	Fraction of Adjusted PA Late Well Limits	Fraction of Adjusted PA Air Limits
8.42E-01	^{3}H, generic	8.80E-01	6.3E+00	6.70E-01			4.2E+00	0.208	0.208		
3.87E+00	^{3}H, 232-F Rubble	3.94E+00		6.70E-01		1.26E+01	8.4E+00	0.467	0.467		
8.14E-05	^{129}I F Area Filtercake	8.14E-05	3.2E-03	6.70E-01			2.1E-03	0.038		0.038	
1.09E-03	^{237}Np	1.09E-03	4.8E-02	6.70E-01			3.2E-02	0.034		0.034	
6.09E-02	^{14}C	6.09E-02	2.7E+00		5.00E+01		1.4E+02	0.0005			0.0005
1.87E-05	^{129}I Generic	2.47E-05	1.0E-03	6.70E-01			6.7E-04	0.037	0.037		
1.24E-01	^{238}U	1.24E-01	7.4E+00	6.70E-01			5.0E+00	0.025		0.025	
							Sum-of-Fraction	0.810	0.712	0.097	0.0005

Current Total SOF:	8.82E-01	Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Target SOF:	9.00E-01	3H, generic	8.42E-01	6.30E+00	3.78E-02	8.80E-01
Remaining SOF:	1.80E-02	3H, 232-F Rubble	3.87E+00	1.26E+01	7.56E-02	3.94E+00
		129I F Area Filtercake	8.14E-05	3.20E-03		
		237Np	1.09E-03	4.80E-02		
		14C	6.09E-02	2.70E+00		
		129I Generic	1.87E-05	1.00E-03	6.00E-06	2.47E-05
		238U	1.24E-01	7.40E+00		

Table B4 Slit Trench #1, including 232-F Rubble Tritium Limit, additional radionuclides are only generic tritium

Test Case Add Only Generic H-3

Table 3 Estimated Aggregate Effects of Studies On Slit Trench #1, including 232-F rubble tritium limit

	Primary Isotopes Of Concern	**Slit Trench #1 (Ci)**	**Slit Trenches PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**232-F Tritium Limit**	**Adjusted Slit Trenches PA Limit (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Air Limits**
8.42E-01	^{3}H, generic	9.55E-01	6.3E+00	6.70E-01			4.2E+00	0.226	0.226		
3.87E+00	^{3}H, 232-F Rubble	3.87E+00		6.70E-01		1.26E+01	8.4E+00	0.458	0.458		
8.14E-05	^{129}I F Area Filtercake	8.14E-05	3.2E-03	6.70E-01			2.1E-03	0.038		0.038	
1.09E-03	^{237}Np	1.09E-03	4.8E-02	6.70E-01			3.2E-02	0.034		0.034	
6.09E-02	^{14}C	6.09E-02	2.7E+00		5.00E+01		1.4E+02	0.0005			0.0005
1.87E-05	^{129}I Generic	1.87E-05	1.0E-03	6.70E-01			6.7E-04	0.028	0.028		
1.24E-01	^{238}U	1.24E-01	7.4E+00	6.70E-01			5.0E+00	0.025		0.025	
							Sum-of-Fraction	0.810	0.712	0.097	0.0005

Current Total SOF:	8.82E-01	Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Target SOF:	9.00E-01	3H, generic	8.42E-01	6.30E+00	1.13E-01	9.55E-01
Remaining SOF:	1.80E-02	3H, 232-F Rubble	3.87E+00	1.26E+01		
		129I F Area Filtercake	8.14E-05	3.20E-03		
		237Np	1.09E-03	4.80E-02		
		14C	6.09E-02	2.70E+00		
		129I Generic	1.87E-05	1.00E-03		
		238U	1.24E-01	7.40E+00		

Table B5 Slit Trench #1, including 232-F Rubble Tritium Limit, additional radionuclides are only 232-F Rubble Tritium

Test Case Add Only 232-F Rubble H-3

Table 3 Estimated Aggregate Effects of Studies On Slit Trench #1, including 232-F rubble tritium limit

	Primary Isotopes Of Concern	Slit Trench #1 (Ci)	Slit Trenches PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	232-F Tritium Limit	Adjusted Slit Trenches PA Limit (Ci)	Fraction of Adjusted PA Limits	Fraction of Adjusted PA Early Well Limits	Fraction of Adjusted PA Late Well Limits	Fraction of Adjusted PA Air Limits
8.42E-01	^{3}H, generic	8.42E-01	6.3E+00	6.70E-01			4.2E+00	0.199	0.199		
3.87E+00	^{3}H, 232-F Rubble	4.09E+00		6.70E-01		1.26E+01	8.4E+00	0.485	0.485		
8.14E-05	^{129}I F Area Filtercake	8.14E-05	3.2E-03	6.70E-01			2.1E-03	0.038		0.038	
1.09E-03	^{237}Np	1.09E-03	4.8E-02	6.70E-01			3.2E-02	0.034		0.034	
6.09E-02	^{14}C	6.09E-02	2.7E+00		5.00E+01		1.4E+02	0.0005			0.0005
1.87E-05	^{129}I Generic	1.87E-05	1.0E-03	6.70E-01			6.7E-04	0.028	0.028		
1.24E-01	^{238}U	1.24E-01	7.4E+00	6.70E-01			5.0E+00	0.025		0.025	
							Sum-of-Fraction	0.810	0.712	0.097	0.0005

Current Total SOF:	8.82E-01	Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Target SOF:	9.00E-01	3H, generic	8.42E-01	6.30E+00		
Remaining SOF:	1.80E-02	3H, 232-F Rubble	3.87E+00	1.26E+01	2.27E-01	4.09E+00
		129I F Area Filtercake	8.14E-05	3.20E-03		
		237Np	1.09E-03	4.80E-02		
		14C	6.09E-02	2.70E+00		
		129I Generic	1.87E-05	1.00E-03		
		238U	1.24E-01	7.40E+00		

Table B6 Slit Trench #1, including 232-F Rubble Tritium Limit, additional radionuclides are only generic I-129

Test Case Add Only Generic I-129

Table 3 Estimated Aggregate Effects of Studies On Slit Trench #1, including 232-F rubble tritium limit

	Primary Isotopes Of Concern	**Slit Trench #1 (Ci)**	**Slit Trenches PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**232-F Tritium Limit**	**Adjusted Slit Trenches PA Limit (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Air Limits**
8.42E-01	^{3}H, generic	8.42E-01	6.3E+00	6.70E-01			4.2E+00	0.199	0.199		
3.87E+00	^{3}H, 232-F Rubble	3.87E+00		6.70E-01		1.26E+01	8.4E+00	0.458	0.458		
8.14E-05	^{129}I F Area Filtercake	8.14E-05	3.2E-03	6.70E-01			2.1E-03	0.038		0.038	
1.09E-03	^{237}Np	1.09E-03	4.8E-02	6.70E-01			3.2E-02	0.034		0.034	
6.09E-02	^{14}C	6.09E-02	2.7E+00		5.00E+01		1.4E+02	0.0005			0.0005
1.87E-05	^{129}I Generic	3.67E-05	1.0E-03	6.70E-01			6.7E-04	0.055	0.055		
1.24E-01	^{238}U	1.24E-01	7.4E+00	6.70E-01			5.0E+00	0.025		0.025	
							Sum-of-Fraction	0.810	0.712	0.097	0.0005

Current Total SOF:	8.82E-01	Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Target SOF:	9.00E-01	3H, generic	8.42E-01	6.30E+00		
Remaining SOF:	1.80E-02	3H, 232-F Rubble	3.87E+00	1.26E+01		
		129I F Area Filtercake	8.14E-05	3.20E-03		
		237Np	1.09E-03	4.80E-02		
		14C	6.09E-02	2.70E+00		
		129I Generic	1.87E-05	1.00E-03	1.80E-05	3.67E-05
		238U	1.24E-01	7.40E+00		

Table B7 Slit Trench #1, including 232-F Rubble Tritium Limit, additional radionuclides are only C-14

Test Case Add Only C-14

Table 3 Estimated Aggregate Effects of Studies On Slit Trench #1, including 232-F rubble tritium limit

	Primary Isotopes Of Concern	**Slit Trench #1 (Ci)**	**Slit Trenches PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**232-F Tritium Limit**	**Adjusted Slit Trenches PA Limit (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Air Limits**
8.42E-01	^{3}H, generic	8.42E-01	6.3E+00	6.70E-01			4.2E+00	0.199	0.199		
3.87E+00	^{3}H, 232-F Rubble	3.87E+00		6.70E-01		1.26E+01	8.4E+00	0.458	0.458		
8.14E-05	^{129}I F Area Filtercake	8.14E-05	3.2E-03	6.70E-01			2.1E-03	0.038		0.038	
1.09E-03	^{237}Np	1.09E-03	4.8E-02	6.70E-01			3.2E-02	0.034		0.034	
6.09E-02	^{14}C	1.09E-01	2.7E+00		5.00E+01		1.4E+02	0.0008			0.0008
1.87E-05	^{129}I Generic	1.87E-05	1.0E-03	6.70E-01			6.7E-04	0.028	0.028		
1.24E-01	^{238}U	1.24E-01	7.4E+00	6.70E-01			5.0E+00	0.025		0.025	
							Sum-of-Fraction	0.783	0.686	0.097	0.0008

Current Total SOF:	8.82E-01	Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Target SOF:	9.00E-01	3H, generic	8.42E-01	6.30E+00		
Remaining SOF:	1.80E-02	3H, 232-F Rubble	3.87E+00	1.26E+01		
		129I F Area Filtercake	8.14E-05	3.20E-03		
		237Np	1.09E-03	4.80E-02		
		14C	6.09E-02	2.70E+00	4.86E-02	1.09E-01
		129I Generic	1.87E-05	1.00E-03		
		238U	1.24E-01	7.40E+00		

Table B8 Slit Trench #1, including 232-F Rubble Tritium Limit, additional radionuclides are only late well radionuclides

Test Case Add only Late Well

Table 3 Estimated Aggregate Effects of Studies On Slit Trench #1, including 232-F rubble tritium limit

	Primary Isotopes Of Concern	**Slit Trench #1 (Ci)**	**Slit Trenches PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**232-F Tritium Limit**	**Adjusted Slit Trenches PA Limit (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Air Limits**
8.42E-01	^{3}H, generic	8.42E-01	6.3E+00	6.70E-01			4.2E+00	0.199	0.199		
3.87E+00	^{3}H, 232-F Rubble	3.87E+00		6.70E-01		1.26E+01	8.4E+00	0.458	0.458		
8.14E-05	^{129}I F Area Filtercake	1.01E-04	3.2E-03	6.70E-01			2.1E-03	0.047		0.047	
1.09E-03	^{237}Np	1.37E-03	4.8E-02	6.70E-01			3.2E-02	0.043		0.043	
6.09E-02	^{14}C	6.09E-02	2.7E+00		5.00E+01		1.4E+02	0.0005			0.0005
1.87E-05	^{129}I Generic	1.87E-05	1.0E-03	6.70E-01			6.7E-04	0.028	0.028		
1.24E-01	^{238}U	1.68E-01	7.4E+00	6.70E-01			5.0E+00	0.034		0.034	
							Sum-of-Fraction	0.810	0.686	0.124	0.0005

Current Total SOF:	8.82E-01	Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Target SOF:	9.00E-01	3H, generic	8.42E-01	6.30E+00		
Remaining SOF:	1.80E-02	3H, 232-F Rubble	3.87E+00	1.26E+01		
		129I F Area Filtercake	8.14E-05	3.20E-03	1.92E-05	1.01E-04
		237Np	1.09E-03	4.80E-02	2.88E-04	1.37E-03
		14C	6.09E-02	2.70E+00		
		129I Generic	1.87E-05	1.00E-03		
		238U	1.24E-01	7.40E+00	4.44E-02	1.68E-01

Table B9 Slit Trench #1, including 232-F Rubble Tritium Limit, additional radionuclides are only U-238

Test Case Add Only U-238

Table 3 Estimated Aggregate Effects of Studies On Slit Trench #1, including 232-F rubble tritium limit

	Primary Isotopes Of Concern	**Slit Trench #1 (Ci)**	**Slit Trenches PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**232-F Tritium Limit**	**Adjusted Slit Trenches PA Limit (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Air Limits**
8.42E-01	^{3}H, generic	8.42E-01	6.3E+00	6.70E-01			4.2E+00	0.199	0.199		
3.87E+00	^{3}H, 232-F Rubble	3.87E+00		6.70E-01		1.26E+01	8.4E+00	0.458	0.458		
8.14E-05	^{129}I F Area Filtercake	8.14E-05	3.2E-03	6.70E-01			2.1E-03	0.038		0.038	
1.09E-03	^{237}Np	1.09E-03	4.8E-02	6.70E-01			3.2E-02	0.034		0.034	
6.09E-02	^{14}C	6.09E-02	2.7E+00		5.00E+01		1.4E+02	0.0005			0.0005
1.87E-05	^{129}I Generic	1.87E-05	1.0E-03	6.70E-01			6.7E-04	0.028	0.028		
1.24E-01	^{238}U	2.57E-01	7.4E+00	6.70E-01			5.0E+00	0.052		0.052	
							Sum-of-Fraction	0.810	0.686	0.124	0.0005

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	8.82E-01					
Current Target SOF:	9.00E-01	3H, generic	8.42E-01	6.30E+00		
Remaining SOF:	1.80E-02	3H, 232-F Rubble	3.87E+00	1.26E+01		
		129I F Area Filtercake	8.14E-05	3.20E-03		
		237Np	1.09E-03	4.80E-02		
		14C	6.09E-02	2.70E+00		
		129I Generic	1.87E-05	1.00E-03		
		238U	1.24E-01	7.40E+00	1.33E-01	2.57E-01

Table B10 Slit Trench #2, no additional radionuclides

Test Case Base Case

Table 4 Estimated Aggregate Effects of Studies on Slit Trench #2

	Primary Isotopes of Concern	**Slit Trench #2 (Ci)**	**Slit Trench PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**Adjusted Slit Trench PA Limit (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Resident Limit**	**Fraction of Adjusted PA Air Limits**	**Fraction of PA Radon Limit**
6.00E-01	H3	6.00E-01	6.3E+00	6.7E-01		4.2E+00	0.142	0.142				
2.56E-04	I129 F-Area Filtercake	2.56E-04	3.2E-03	6.7E-01		2.1E-03	0.120		0.120			
2.80E+00	U234 M Area Glass	2.80E+00	4.9E+01			4.9E+01	0.057					0.057
1.05E+01	U238 M Area Glass	1.05E+01	2.0E+02			2.0E+02	0.053			0.053		
1.20E-01	C14	1.20E-01	2.7E+00		5.0E+01	1.4E+02	0.0009				0.0009	
3.10E-01	U238	3.10E-01	7.4E+00	6.7E-01		5.0E+00	0.063		0.063			
1.54E-03	Np237	1.54E-03	4.8E-02	6.7E-01		3.2E-02	0.048		0.048			
1.47E-02	Tc99	1.47E-02	6.1E-01	6.7E-01		4.1E-01	0.036	0.036				
4.99E-05	I129 F-Area CG-8	4.99E-05	3.2E-03	6.7E-01		2.1E-03	0.023		0.023			
1.38E-05	I129 Generic	1.38E-05	1.0E-03	6.7E-01		6.7E-04	0.021	0.021				
1.37E-01	U234	1.37E-01	1.1E+01	6.7E-01		7.4E+00	0.019		0.019			
4.32E-03	I129 F-WTU Dowex 21K	4.32E-03	4.2E-01	6.7E-01		2.8E-01	0.015		0.015			
1.92E-02	U233 Depleted	1.92E-02	1.9E+00	6.7E-01		1.3E+00	0.015		0.015			
						Sum-of-Fraction	**0.612**	**0.199**	**0.302**	**0.053**	**0.0009**	**0.057**

		Nuclide	Current Ci	Current Limit
Current Total SOF:	5.08E-01	H3	6.00E-01	6.30E+00
Current Target SOF:	8.50E-01	I129 F-Area Filtercake	2.56E-04	3.20E-03
Remaining SOF:	3.42E-01	U234 M Area Glass	2.80E+00	4.90E+01
		U238 M Area Glass	1.05E+01	2.00E+02
		C14	1.20E-01	2.70E+00
		U238	3.10E-01	7.40E+00
		Np237	1.54E-03	4.80E-02
		Tc99	1.47E-02	6.10E-01
		I129 F-Area CG-8	4.99E-05	3.20E-03
		I129 Generic	1.38E-05	1.00E-03
		U234	1.37E-01	1.10E+01
		I129 F-WTU Dowex 21K	4.32E-03	4.20E-01
		U233 Depleted	1.92E-02	1.90E+00

Table B11 Slit Trench #2, additional radionuclides have same distribution as those already disposed

Test Case Add Same Distribution Case

Table 4 Estimated Aggregate Effects of Studies on Slit Trench #2

	Primary Isotopes of Concern	**Slit Trench #2 (Ci)**	**Slit Trench PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**Adjusted Slit Trench PA Limit (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Resident Limit**	**Fraction of Adjusted PA Air Limits**	**Fraction of PA Radon Limit**
6.00E-01	H3	1.02E+00	6.3E+00	6.7E-01		4.2E+00	0.241	0.241				
2.56E-04	I129 F-Area Filtercake	4.35E-04	3.2E-03	6.7E-01		2.1E-03	0.203		0.203			
2.80E+00	U234 M Area Glass	4.75E+00	4.9E+01			4.9E+01	0.097					0.097
1.05E+01	U238 M Area Glass	1.79E+01	2.0E+02			2.0E+02	0.089			0.089		
1.20E-01	C14	2.04E-01	2.7E+00		5.0E+01	1.4E+02	0.0015				0.0015	
3.10E-01	U238	5.27E-01	7.4E+00	6.7E-01		5.0E+00	0.106		0.106			
1.54E-03	Np237	2.62E-03	4.8E-02	6.7E-01		3.2E-02	0.082		0.082			
1.47E-02	Tc99	2.50E-02	6.1E-01	6.7E-01		4.1E-01	0.061	0.061				
4.99E-05	I129 F-Area CG-8	8.47E-05	3.2E-03	6.7E-01		2.1E-03	0.039		0.039			
1.38E-05	I129 Generic	2.35E-05	1.0E-03	6.7E-01		6.7E-04	0.035	0.035				
1.37E-01	U234	2.33E-01	1.1E+01	6.7E-01		7.4E+00	0.032		0.032			
4.32E-03	I129 F-WTU Dowex 21K	7.34E-03	4.2E-01	6.7E-01		2.8E-01	0.026		0.026			
1.92E-02	U233 Depleted	3.26E-02	1.9E+00	6.7E-01		1.3E+00	0.026		0.026			
						Sum-of-Fraction	**1.039**	**0.338**	**0.514**	**0.089**	**0.0015**	**0.097**

		Nuclide	Current Ci	Current Limit	Limit Fract	Fract SOF	Add Fract	Add Ci	New Total Ci
Current Total SOF:	5.08E-01	H3	6.00E-01	6.30E+00	9.53E-02	1.94E-01	6.65E-02	4.19E-01	1.02E+00
Current Target SOF:	8.50E-01	I129 F-Area Filtercake	2.56E-04	3.20E-03	8.01E-02	1.63E-01	5.59E-02	1.79E-04	4.35E-04
Remaining SOF:	3.42E-01	U234 M Area Glass	2.80E+00	4.90E+01	5.71E-02	1.16E-01	3.98E-02	1.95E+00	4.75E+00
		U238 M Area Glass	1.05E+01	2.00E+02	5.26E-02	1.07E-01	3.67E-02	7.34E+00	1.79E+01
		C14	1.20E-01	2.70E+00	4.44E-02	9.06E-02	3.10E-02	8.37E-02	2.04E-01
		U238	3.10E-01	7.40E+00	4.19E-02	8.55E-02	2.93E-02	2.16E-01	5.27E-01
		Np237	1.54E-03	4.80E-02	3.22E-02	6.57E-02	2.25E-02	1.08E-03	2.62E-03
		Tc99	1.47E-02	6.10E-01	2.42E-02	4.93E-02	1.69E-02	1.03E-02	2.50E-02
		I129 F-Area CG-8	4.99E-05	3.20E-03	1.56E-02	3.18E-02	1.09E-02	3.48E-05	8.47E-05
		I129 Generic	1.38E-05	1.00E-03	1.38E-02	2.82E-02	9.64E-03	9.64E-06	2.35E-05
		U234	1.37E-01	1.10E+01	1.25E-02	2.55E-02	8.71E-03	9.58E-02	2.33E-01
		I129 F-WTU Dowex 21K	4.32E-03	4.20E-01	1.03E-02	2.10E-02	7.18E-03	3.02E-03	7.34E-03
		U233 Depleted	1.92E-02	1.90E+00	1.01E-02	2.06E-02	7.06E-03	1.34E-02	3.26E-02
				SOF	4.90E-01	1.00E+00			

Table B12 Slit Trench #2, additional radionuclides are only early well radionuclides

Test Case Add Only Early Well

Table 4 Estimated Aggregate Effects of Studies on Slit Trench #2

	Primary Isotopes of Concern	Slit Trench #2 (Ci)	Slit Trench PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	Adjusted Slit Trench PA Limit (Ci)	Fraction of Adjusted PA Limits	Fraction of Adjusted PA Early Well Limits	Fraction of Adjusted PA Late Well Limits	Fraction of Adjusted PA Resident Limit	Fraction of Adjusted PA Air Limits	Fraction of PA Radon Limit
6.00E-01	H3	1.32E+00	6.3E+00	6.7E-01		4.2E+00	0.312	0.312				
2.56E-04	I129 F-Area Filtercake	2.56E-04	3.2E-03	6.7E-01		2.1E-03	0.120		0.120			
2.80E+00	U234 M Area Glass	2.80E+00	4.9E+01			4.9E+01	0.057					0.057
1.05E+01	U238 M Area Glass	1.05E+01	2.0E+02			2.0E+02	0.053			0.053		
1.20E-01	C14	1.20E-01	2.7E+00		5.0E+01	1.4E+02	0.0009				0.0009	
3.10E-01	U238	3.10E-01	7.4E+00	6.7E-01		5.0E+00	0.063		0.063			
1.54E-03	Np237	1.54E-03	4.8E-02	6.7E-01		3.2E-02	0.048		0.048			
1.47E-02	Tc99	8.43E-02	6.1E-01	6.7E-01		4.1E-01	0.206	0.206				
4.99E-05	I129 F-Area CG-8	4.99E-05	3.2E-03	6.7E-01		2.1E-03	0.023		0.023			
1.38E-05	I129 Generic	1.28E-04	1.0E-03	6.7E-01		6.7E-04	0.191	0.191				
1.37E-01	U234	1.37E-01	1.1E+01	6.7E-01		7.4E+00	0.019		0.019			
4.32E-03	I129 F-WTU Dowex 21K	4.32E-03	4.2E-01	6.7E-01		2.8E-01	0.015		0.015			
1.92E-02	U233 Depleted	1.92E-02	1.9E+00	6.7E-01		1.3E+00	0.015		0.015			
						Sum-of-Fraction	**1.122**	**0.709**	**0.302**	**0.053**	**0.0009**	**0.057**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	5.08E-01	H3	6.00E-01	6.30E+00	7.18E-01	1.32E+00
Current Target SOF:	8.50E-01	I129 F-Area Filtercake	2.56E-04	3.20E-03		
Remaining SOF:	3.42E-01	U234 M Area Glass	2.80E+00	4.90E+01		
		U238 M Area Glass	1.05E+01	2.00E+02		
		C14	1.20E-01	2.70E+00		
		U238	3.10E-01	7.40E+00		
		Np237	1.54E-03	4.80E-02		
		Tc99	1.47E-02	6.10E-01	6.95E-02	8.43E-02
		I129 F-Area CG-8	4.99E-05	3.20E-03		
		I129 Generic	1.38E-05	1.00E-03	1.14E-04	1.28E-04
		U234	1.37E-01	1.10E+01		
		I129 F-WTU Dowex 21K	4.32E-03	4.20E-01		
		U233 Depleted	1.92E-02	1.90E+00		

Table B13 Slit Trench #2, additional radionuclides are only tritium

Test Case Add Only Tritium

Table 4 Estimated Aggregate Effects of Studies on Slit Trench #2

	Primary Isotopes of Concern	Slit Trench #2 (Ci)	Slit Trench PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	Adjusted Slit Trench PA Limit (Ci)	Fraction of Adjusted PA Limits	Fraction of Adjusted PA Early Well Limits	Fraction of Adjusted PA Late Well Limits	Fraction of Adjusted PA Resident Limit	Fraction of Adjusted PA Air Limits	Fraction of PA Radon Limit
6.00E-01	H3	2.75E+00	6.3E+00	6.7E-01		4.2E+00	0.653	0.653				
2.56E-04	I129 F-Area Filtercake	2.56E-04	3.2E-03	6.7E-01		2.1E-03	0.120		0.120			
2.80E+00	U234 M Area Glass	2.80E+00	4.9E+01			4.9E+01	0.057					0.057
1.05E+01	U238 M Area Glass	1.05E+01	2.0E+02			2.0E+02	0.053			0.053		
1.20E-01	C14	1.20E-01	2.7E+00		5.0E+01	1.4E+02	0.0009				0.0009	
3.10E-01	U238	3.10E-01	7.4E+00	6.7E-01		5.0E+00	0.063		0.063			
1.54E-03	Np237	1.54E-03	4.8E-02	6.7E-01		3.2E-02	0.048		0.048			
1.47E-02	Tc99	1.47E-02	6.1E-01	6.7E-01		4.1E-01	0.036	0.036				
4.99E-05	I129 F-Area CG-8	4.99E-05	3.2E-03	6.7E-01		2.1E-03	0.023		0.023			
1.38E-05	I129 Generic	1.38E-05	1.0E-03	6.7E-01		6.7E-04	0.021	0.021				
1.37E-01	U234	1.37E-01	1.1E+01	6.7E-01		7.4E+00	0.019		0.019			
4.32E-03	I129 F-WTU Dowex 21K	4.32E-03	4.2E-01	6.7E-01		2.8E-01	0.015		0.015			
1.92E-02	U233 Depleted	1.92E-02	1.9E+00	6.7E-01		1.3E+00	0.015		0.015			
						Sum-of-Fraction	**1.122**	**0.709**	**0.302**	**0.053**	**0.0009**	**0.057**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	5.08E-01	H3	6.00E-01	6.30E+00	2.15E+00	2.75E+00
Current Target SOF:	8.50E-01	I129 F-Area Filtercake	2.56E-04	3.20E-03		
Remaining SOF:	3.42E-01	U234 M Area Glass	2.80E+00	4.90E+01		
		U238 M Area Glass	1.05E+01	2.00E+02		
		C14	1.20E-01	2.70E+00		
		U238	3.10E-01	7.40E+00		
		Np237	1.54E-03	4.80E-02		
		Tc99	1.47E-02	6.10E-01		
		I129 F-Area CG-8	4.99E-05	3.20E-03		
		I129 Generic	1.38E-05	1.00E-03		
		U234	1.37E-01	1.10E+01		
		I129 F-WTU Dowex 21K	4.32E-03	4.20E-01		
		U233 Depleted	1.92E-02	1.90E+00		

Table B14 Slit Trench #2, additional radionuclides are only late well radionuclides

Test Case Add Only Late Well

Table 4 Estimated Aggregate Effects of Studies on Slit Trench #2

	Primary Isotopes of Concern	**Slit Trench #2 (Ci)**	**Slit Trench PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**Adjusted Slit Trench PA Limit (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Resident Limit**	**Fraction of Adjusted PA Air Limits**	**Fraction of PA Radon Limit**
6.00E-01	H3	6.00E-01	6.3E+00	6.7E-01		4.2E+00	0.142	0.142				
2.56E-04	I129 F-Area Filtercake	4.13E-04	3.2E-03	6.7E-01		2.1E-03	0.192		0.192			
2.80E+00	U234 M Area Glass	2.80E+00	4.9E+01			4.9E+01	0.057					0.057
1.05E+01	U238 M Area Glass	1.05E+01	2.0E+02			2.0E+02	0.053			0.053		
1.20E-01	C14	1.20E-01	2.7E+00		5.0E+01	1.4E+02	0.0009				0.0009	
3.10E-01	U238	6.72E-01	7.4E+00	6.7E-01		5.0E+00	0.135		0.135			
1.54E-03	Np237	3.89E-03	4.8E-02	6.7E-01		3.2E-02	0.121		0.121			
1.47E-02	Tc99	1.47E-02	6.1E-01	6.7E-01		4.1E-01	0.036	0.036				
4.99E-05	I129 F-Area CG-8	2.06E-04	3.2E-03	6.7E-01		2.1E-03	0.096		0.096			
1.38E-05	I129 Generic	1.38E-05	1.0E-03	6.7E-01		6.7E-04	0.021	0.021				
1.37E-01	U234	6.75E-01	1.1E+01	6.7E-01		7.4E+00	0.092		0.092			
4.32E-03	I129 F-WTU Dowex 21K	2.48E-02	4.2E-01	6.7E-01		2.8E-01	0.088		0.088			
1.92E-02	U233 Depleted	1.12E-01	1.9E+00	6.7E-01		1.3E+00	0.088		0.088			
						Sum-of-Fraction	**1.122**	**0.199**	**0.813**	**0.053**	**0.0009**	**0.057**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	5.08E-01	H3	6.00E-01	6.30E+00		
Current Target SOF:	8.50E-01	I129 F-Area Filtercake	2.56E-04	3.20E-03	1.56E-04	4.13E-04
Remaining SOF:	3.42E-01	U234 M Area Glass	2.80E+00	4.90E+01		
		U238 M Area Glass	1.05E+01	2.00E+02		
		C14	1.20E-01	2.70E+00		
		U238	3.10E-01	7.40E+00	3.62E-01	6.72E-01
		Np237	1.54E-03	4.80E-02	2.35E-03	3.89E-03
		Tc99	1.47E-02	6.10E-01		
		I129 F-Area CG-8	4.99E-05	3.20E-03	1.56E-04	2.06E-04
		I129 Generic	1.38E-05	1.00E-03		
		U234	1.37E-01	1.10E+01	5.37E-01	6.75E-01
		I129 F-WTU Dowex 21K	4.32E-03	4.20E-01	2.05E-02	2.48E-02
		U233 Depleted	1.92E-02	1.90E+00	9.28E-02	1.12E-01

Table B15 Slit Trench #2, additional radionuclides are only ^{238}U in M-Area Glass

Test Case Add Only U-238 in M-Area Glass

Table 4 Estimated Aggregate Effects of Studies on Slit Trench #2

	Primary Isotopes of Concern	**Slit Trench #2 (Ci)**	**Slit Trench PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**Adjusted Slit Trench PA Limit (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Resident Limit**	**Fraction of Adjusted PA Air Limits**	**Fraction of PA Radon Limit**
6.00E-01	H3	6.00E-01	6.3E+00	6.7E-01		4.2E+00	0.142	0.142				
2.56E-04	I129 F-Area Filtercake	2.56E-04	3.2E-03	6.7E-01		2.1E-03	0.120		0.120			
2.80E+00	U234 M Area Glass	2.80E+00	4.9E+01			4.9E+01	0.057					0.057
1.05E+01	U238 M Area Glass	7.89E+01	2.0E+02			2.0E+02	0.395			0.395		
1.20E-01	C14	1.20E-01	2.7E+00		5.0E+01	1.4E+02	0.0009				0.0009	
3.10E-01	U238	3.10E-01	7.4E+00	6.7E-01		5.0E+00	0.063		0.063			
1.54E-03	Np237	1.54E-03	4.8E-02	6.7E-01		3.2E-02	0.048		0.048			
1.47E-02	Tc99	1.47E-02	6.1E-01	6.7E-01		4.1E-01	0.036	0.036				
4.99E-05	I129 F-Area CG-8	4.99E-05	3.2E-03	6.7E-01		2.1E-03	0.023		0.023			
1.38E-05	I129 Generic	1.38E-05	1.0E-03	6.7E-01		6.7E-04	0.021	0.021				
1.37E-01	U234	1.37E-01	1.1E+01	6.7E-01		7.4E+00	0.019		0.019			
4.32E-03	I129 F-WTU Dowex 21K	4.32E-03	4.2E-01	6.7E-01		2.8E-01	0.015		0.015			
1.92E-02	U233 Depleted	1.92E-02	1.9E+00	6.7E-01		1.3E+00	0.015		0.015			
						Sum-of-Fraction	**0.954**	**0.199**	**0.302**	**0.395**	**0.0009**	**0.057**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	5.08E-01	H3	6.00E-01	6.30E+00		
Current Target SOF:	8.50E-01	I129 F-Area Filtercake	2.56E-04	3.20E-03		
Remaining SOF:	3.42E-01	U234 M Area Glass	2.80E+00	4.90E+01		
		U238 M Area Glass	1.05E+01	2.00E+02	6.84E+01	7.89E+01
		C14	1.20E-01	2.70E+00		
		U238	3.10E-01	7.40E+00		
		Np237	1.54E-03	4.80E-02		
		Tc99	1.47E-02	6.10E-01		
		I129 F-Area CG-8	4.99E-05	3.20E-03		
		I129 Generic	1.38E-05	1.00E-03		
		U234	1.37E-01	1.10E+01		
		I129 F-WTU Dowex 21K	4.32E-03	4.20E-01		
		U233 Depleted	1.92E-02	1.90E+00		

Table B16 Slit Trench #2, additional radionuclides are only ^{14}C

Test Case Add Only C-14

Table 4 Estimated Aggregate Effects of Studies on Slit Trench #2

	Primary Isotopes of Concern	Slit Trench #2 (Ci)	Slit Trench PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	Adjusted Slit Trench PA Limit (Ci)	Fraction of Adjusted PA Limits	Fraction of Adjusted PA Early Well Limits	Fraction of Adjusted PA Late Well Limits	Fraction of Adjusted PA Resident Limit	Fraction of Adjusted PA Air Limits	Fraction of PA Radon Limit
6.00E-01	H3	6.00E-01	6.3E+00	6.7E-01		4.2E+00	0.142	0.142				
2.56E-04	I129 F-Area Filtercake	2.56E-04	3.2E-03	6.7E-01		2.1E-03	0.120		0.120			
2.80E+00	U234 M Area Glass	2.80E+00	4.9E+01			4.9E+01	0.057					0.057
1.05E+01	U238 M Area Glass	1.05E+01	2.0E+02			2.0E+02	0.053			0.053		
1.20E-01	C14	1.04E+00	2.7E+00		5.0E+01	1.4E+02	0.0077				0.0077	
3.10E-01	U238	3.10E-01	7.4E+00	6.7E-01		5.0E+00	0.063		0.063			
1.54E-03	Np237	1.54E-03	4.8E-02	6.7E-01		3.2E-02	0.048		0.048			
1.47E-02	Tc99	1.47E-02	6.1E-01	6.7E-01		4.1E-01	0.036	0.036				
4.99E-05	I129 F-Area CG-8	4.99E-05	3.2E-03	6.7E-01		2.1E-03	0.023		0.023			
1.38E-05	I129 Generic	1.38E-05	1.0E-03	6.7E-01		6.7E-04	0.021	0.021				
1.37E-01	U234	1.37E-01	1.1E+01	6.7E-01		7.4E+00	0.019		0.019			
4.32E-03	I129 F-WTU Dowex 21K	4.32E-03	4.2E-01	6.7E-01		2.8E-01	0.015		0.015			
1.92E-02	U233 Depleted	1.92E-02	1.9E+00	6.7E-01		1.3E+00	0.015		0.015			
						Sum-of-Fraction	**0.619**	**0.199**	**0.302**	**0.053**	**0.0077**	**0.057**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	5.08E-01	H3	6.00E-01	6.30E+00		
Current Target SOF:	8.50E-01	I129 F-Area Filtercake	2.56E-04	3.20E-03		
Remaining SOF:	3.42E-01	U234 M Area Glass	2.80E+00	4.90E+01		
		U238 M Area Glass	1.05E+01	2.00E+02		
		C14	1.20E-01	2.70E+00	9.23E-01	1.04E+00
		U238	3.10E-01	7.40E+00		
		Np237	1.54E-03	4.80E-02		
		Tc99	1.47E-02	6.10E-01		
		I129 F-Area CG-8	4.99E-05	3.20E-03		
		I129 Generic	1.38E-05	1.00E-03		
		U234	1.37E-01	1.10E+01		
		I129 F-WTU Dowex 21K	4.32E-03	4.20E-01		
		U233 Depleted	1.92E-02	1.90E+00		

Table B17 Slit Trench #2, additional radionuclides are only ^{234}U in M-Area Glass

Test Case Add Only U-234 in M-Area Glass

Table 4 Estimated Aggregate Effects of Studies on Slit Trench #2

	Primary Isotopes of Concern	Slit Trench #2 (Ci)	Slit Trench PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	Adjusted Slit Trench PA Limit (Ci)	Fraction of Adjusted PA Limits	Fraction of Adjusted PA Early Well Limits	Fraction of Adjusted PA Late Well Limits	Fraction of Adjusted PA Resident Limit	Fraction of Adjusted PA Air Limits	Fraction of PA Radon Limit
6.00E-01	H3	6.00E-01	6.3E+00	6.7E-01		4.2E+00	0.142	0.142				
2.56E-04	I129 F-Area Filtercake	2.56E-04	3.2E-03	6.7E-01		2.1E-03	0.120		0.120			
2.80E+00	U234 M Area Glass	1.96E+01	4.9E+01			4.9E+01	0.399					0.399
1.05E+01	U238 M Area Glass	1.05E+01	2.0E+02			2.0E+02	0.053			0.053		
1.20E-01	C14	1.20E-01	2.7E+00		5.0E+01	1.4E+02	0.0009				0.0009	
3.10E-01	U238	3.10E-01	7.4E+00	6.7E-01		5.0E+00	0.063		0.063			
1.54E-03	Np237	1.54E-03	4.8E-02	6.7E-01		3.2E-02	0.048		0.048			
1.47E-02	Tc99	1.47E-02	6.1E-01	6.7E-01		4.1E-01	0.036	0.036				
4.99E-05	I129 F-Area CG-8	4.99E-05	3.2E-03	6.7E-01		2.1E-03	0.023		0.023			
1.38E-05	I129 Generic	1.38E-05	1.0E-03	6.7E-01		6.7E-04	0.021	0.021				
1.37E-01	U234	1.37E-01	1.1E+01	6.7E-01		7.4E+00	0.019		0.019			
4.32E-03	I129 F-WTU Dowex 21K	4.32E-03	4.2E-01	6.7E-01		2.8E-01	0.015		0.015			
1.92E-02	U233 Depleted	1.92E-02	1.9E+00	6.7E-01		1.3E+00	0.015		0.015			
						Sum-of-Fraction	**0.954**	**0.199**	**0.302**	**0.053**	**0.0009**	**0.399**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	5.08E-01	H3	6.00E-01	6.30E+00		
Current Target SOF:	8.50E-01	I129 F-Area Filtercake	2.56E-04	3.20E-03		
Remaining SOF:	3.42E-01	U234 M Area Glass	2.80E+00	4.90E+01	1.68E+01	1.96E+01
		U238 M Area Glass	1.05E+01	2.00E+02		
		C14	1.20E-01	2.70E+00		
		U238	3.10E-01	7.40E+00		
		Np237	1.54E-03	4.80E-02		
		Tc99	1.47E-02	6.10E-01		
		I129 F-Area CG-8	4.99E-05	3.20E-03		
		I129 Generic	1.38E-05	1.00E-03		
		U234	1.37E-01	1.10E+01		
		I129 F-WTU Dowex 21K	4.32E-03	4.20E-01		
		U233 Depleted	1.92E-02	1.90E+00		

Table B18 Engineered Trench, no additional radionuclides

Test Case Base Case

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	**Engr. Trench #1 (Ci)**	**Engr. Trench PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**Adjusted Engr. Trench PA Limits (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Air Limit**
9.41E-01	H3	9.41E-01	6.3E+00	6.7E-01		4.2E+00	0.223	0.223		
7.33E-02	U233	7.33E-02	1.9E+00	6.7E-01		1.3E+00	0.058		0.058	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**0.511**	**0.325**	**0.185**	**0.0004**

		Nuclide	Current Ci	Current Limit	Limit Fract
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00	1.49E-01
Current Target SOF:	9.00E-01	U233	7.33E-02	1.9E+00	3.86E-02
Remaining SOF:	5.20E-01	I129 Generic	3.76E-05	1.0E-03	3.76E-02
		Np237	1.78E-03	4.8E-02	3.71E-02
		Tc99	1.88E-02	6.1E-01	3.09E-02
		C14	5.03E-02	2.7E+00	1.86E-02
		U234	1.49E-01	1.1E+01	1.35E-02
		U238	9.89E-02	7.4E+00	1.34E-02
		I129 F-Area Filtercake	3.60E-05	3.2E-03	1.13E-02
		Sr90	5.24E+00	5.1E+02	1.03E-02
				SOF	3.61E-01

Table B19 Engineered Trench, additional radionuclides have same distribution as those already disposed

Test Case Same Distribution of Nuclides

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	**Engr. Trench #1 (Ci)**	**Engr. Trench PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**Adjusted Engr. Trench PA Limits (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Air Limit**
9.41E-01	H3	2.30E+00	6.3E+00	6.7E-01		4.2E+00	0.544	0.544		
7.33E-02	U233	1.79E-01	1.9E+00	6.7E-01		1.3E+00	0.141		0.141	
3.76E-05	I129 Generic	9.17E-05	1.0E-03	6.7E-01		6.7E-04	0.137	0.137		
1.78E-03	Np237	4.35E-03	4.8E-02	6.7E-01		3.2E-02	0.135		0.135	
1.88E-02	Tc99	4.60E-02	6.1E-01	6.7E-01		4.1E-01	0.113	0.113		
5.03E-02	C14	1.23E-01	2.7E+00		5.0E+01	1.4E+02	0.0009			0.0009
1.49E-01	U234	3.64E-01	1.1E+01	6.7E-01		7.4E+00	0.049		0.049	
9.89E-02	U238	2.41E-01	7.4E+00	6.7E-01		5.0E+00	0.049		0.049	
3.60E-05	I129 F-Area Filtercake	8.79E-05	3.2E-03	6.7E-01		2.1E-03	0.041		0.041	
5.24E+00	Sr90	1.28E+01	5.1E+02	6.7E-01		3.4E+02	0.037		0.037	
						Sum-of-Fractions	**1.247**	**0.794**	**0.453**	**0.0009**

Current Total SOF:	3.80E-01
Current Target SOF:	9.00E-01
Remaining SOF:	5.20E-01

Nuclide	Current Ci	Current Limit	Limit Fract	Fract SOF	Add Fract	Add Ci	New Total Ci
H3	9.41E-01	6.3E+00	1.49E-01	4.14E-01	2.15E-01	1.36E+00	2.30E+00
U233	7.33E-02	1.9E+00	3.86E-02	1.07E-01	5.57E-02	1.06E-01	1.79E-01
I129 Generic	3.76E-05	1.0E-03	3.76E-02	1.04E-01	5.42E-02	5.42E-05	9.17E-05
Np237	1.78E-03	4.8E-02	3.71E-02	1.03E-01	5.35E-02	2.57E-03	4.35E-03
Tc99	1.88E-02	6.1E-01	3.09E-02	8.57E-02	4.45E-02	2.72E-02	4.60E-02
C14	5.03E-02	2.7E+00	1.86E-02	5.17E-02	2.69E-02	7.25E-02	1.23E-01
U234	1.49E-01	1.1E+01	1.35E-02	3.76E-02	1.95E-02	2.15E-01	3.64E-01
U238	9.89E-02	7.4E+00	1.34E-02	3.70E-02	1.93E-02	1.43E-01	2.41E-01
I129 F-Area Filtercake	3.60E-05	3.2E-03	1.13E-02	3.12E-02	1.62E-02	5.19E-05	8.79E-05
Sr90	5.24E+00	5.1E+02	1.03E-02	2.85E-02	1.48E-02	7.55E+00	1.28E+01
		SOF	3.61E-01	1.00E+00			

Table B20 Engineered Trench, additional radionuclides are only C-14

Test Case Add Only C-14

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	**Engr. Trench #1 (Ci)**	**Engr. Trench PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**Adjusted Engr. Trench PA Limits (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Air Limit**
9.41E-01	H3	9.41E-01	6.3E+00	6.7E-01		4.2E+00	0.223	0.223		
7.33E-02	U233	7.33E-02	1.9E+00	6.7E-01		1.3E+00	0.058		0.058	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	1.45E+00	2.7E+00		5.0E+01	1.4E+02	0.0108			0.0108
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**0.521**	**0.325**	**0.185**	**0.0108**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00		
Current Target SOF:	9.00E-01	U233	7.33E-02	1.9E+00		
Remaining SOF:	5.20E-01	I129 Generic	3.76E-05	1.0E-03		
		Np237	1.78E-03	4.8E-02		
		Tc99	1.88E-02	6.1E-01		
		C14	5.03E-02	2.7E+00	1.40E+00	1.45E+00
		U234	1.49E-01	1.1E+01		
		U238	9.89E-02	7.4E+00		
		I129 F-Area Filtercake	3.60E-05	3.2E-03		
		Sr90	5.24E+00	5.1E+02		

Table B21 Engineered Trench, additional radionuclides are only early well radionuclides

Test Case Add Only Early Well

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	Engr. Trench #1 (Ci)	Engr. Trench PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	Adjusted Engr. Trench PA Limits (Ci)	Fraction of Adjusted PA Limits	Fraction of Adjusted PA Early Well Limits	Fraction of Adjusted PA Late Well Limits	Fraction of Adjusted PA Air Limit
9.41E-01	H3	2.03E+00	6.3E+00	6.7E-01		4.2E+00	0.482	0.482		
7.33E-02	U233	7.33E-02	1.9E+00	6.7E-01		1.3E+00	0.058		0.058	
3.76E-05	I129 Generic	2.11E-04	1.0E-03	6.7E-01		6.7E-04	0.315	0.315		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	1.25E-01	6.1E-01	6.7E-01		4.1E-01	0.305	0.305		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**1.287**	**1.101**	**0.185**	**0.0004**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00	1.09E+00	2.03E+00
Current Target SOF:	9.00E-01	U233	7.33E-02	1.9E+00		
Remaining SOF:	5.20E-01	I129 Generic	3.76E-05	1.0E-03	1.73E-04	2.11E-04
		Np237	1.78E-03	4.8E-02		
		Tc99	1.88E-02	6.1E-01	1.06E-01	1.25E-01
		C14	5.03E-02	2.7E+00		
		U234	1.49E-01	1.1E+01		
		U238	9.89E-02	7.4E+00		
		I129 F-Area Filtercake	3.60E-05	3.2E-03		
		Sr90	5.24E+00	5.1E+02		

Table B22 Engineered Trench, additional radionuclides are only tritium

Test Case Add Only Tritium

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	Engr. Trench #1 (Ci)	Engr. Trench PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	Adjusted Engr. Trench PA Limits (Ci)	Fraction of Adjusted PA Limits	Fraction of Adjusted PA Early Well Limits	Fraction of Adjusted PA Late Well Limits	Fraction of Adjusted PA Air Limit
9.41E-01	H3	4.22E+00	6.3E+00	6.7E-01		4.2E+00	0.999	0.999		
7.33E-02	U233	7.33E-02	1.9E+00	6.7E-01		1.3E+00	0.058		0.058	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**1.287**	**1.101**	**0.185**	**0.0004**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00	3.28E+00	4.22E+00
Current Target SOF:	9.00E-01	U233	7.33E-02	1.9E+00		
Remaining SOF:	5.20E-01	I129 Generic	3.76E-05	1.0E-03		
		Np237	1.78E-03	4.8E-02		
		Tc99	1.88E-02	6.1E-01		
		C14	5.03E-02	2.7E+00		
		U234	1.49E-01	1.1E+01		
		U238	9.89E-02	7.4E+00		
		I129 F-Area Filtercake	3.60E-05	3.2E-03		
		Sr90	5.24E+00	5.1E+02		

Table B23 Engineered Trench, additional radionuclides are only generic I-129

Test Case Add Only I-129 Generic

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	Engr. Trench #1 (Ci)	Engr. Trench PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	Adjusted Engr. Trench PA Limits (Ci)	Fraction of Adjusted PA Limits	Fraction of Adjusted PA Early Well Limits	Fraction of Adjusted PA Late Well Limits	Fraction of Adjusted PA Air Limit
9.41E-01	H3	9.41E-01	6.3E+00	6.7E-01		4.2E+00	0.223	0.223		
7.33E-02	U233	7.33E-02	1.9E+00	6.7E-01		1.3E+00	0.058		0.058	
3.76E-05	I129 Generic	5.58E-04	1.0E-03	6.7E-01		6.7E-04	0.832	0.832		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**1.287**	**1.101**	**0.185**	**0.0004**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00		
Current Target SOF:	9.00E-01	U233	7.33E-02	1.9E+00		
Remaining SOF:	5.20E-01	I129 Generic	3.76E-05	1.0E-03	5.20E-04	5.58E-04
		Np237	1.78E-03	4.8E-02		
		Tc99	1.88E-02	6.1E-01		
		C14	5.03E-02	2.7E+00		
		U234	1.49E-01	1.1E+01		
		U238	9.89E-02	7.4E+00		
		I129 F-Area Filtercake	3.60E-05	3.2E-03		
		Sr90	5.24E+00	5.1E+02		

Table B24 Engineered Trench, additional radionuclides are only Tc-99

Test Case Add Only Tc-99

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	**Engr. Trench #1 (Ci)**	**Engr. Trench PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**Adjusted Engr. Trench PA Limits (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Air Limit**
9.41E-01	H3	9.41E-01	6.3E+00	6.7E-01		4.2E+00	0.223	0.223		
7.33E-02	U233	7.33E-02	1.9E+00	6.7E-01		1.3E+00	0.058		0.058	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	3.36E-01	6.1E-01	6.7E-01		4.1E-01	0.822	0.822		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**1.287**	**1.101**	**0.185**	**0.0004**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00		
Current Target SOF:	9.00E-01	U233	7.33E-02	1.9E+00		
Remaining SOF:	5.20E-01	I129 Generic	3.76E-05	1.0E-03		
		Np237	1.78E-03	4.8E-02		
		Tc99	1.88E-02	6.1E-01	3.17E-01	3.36E-01
		C14	5.03E-02	2.7E+00		
		U234	1.49E-01	1.1E+01		
		U238	9.89E-02	7.4E+00		
		I129 F-Area Filtercake	3.60E-05	3.2E-03		
		Sr90	5.24E+00	5.1E+02		

Table B25 Engineered Trench, additional radionuclides are only Tritium, Target SOF Reduced to 0.800

Test Case — Target SOF = 0.800 Add Only Tritium

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

Test Case	Primary Isotopes of Concern	Engr. Trench #1 (Ci)	Engr. Trench PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	Adjusted Engr. Trench PA Limits (Ci)	Fraction of Adjusted PA Limits	Fraction of Adjusted PA Early Well Limits	Fraction of Adjusted PA Late Well Limits	Fraction of Adjusted PA Air Limit
9.41E-01	H3	3.59E+00	6.3E+00	6.7E-01		4.2E+00	0.850	0.850		
7.33E-02	U233	7.33E-02	1.9E+00	6.7E-01		1.3E+00	0.058		0.058	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**1.138**	**0.952**	**0.185**	**0.0004**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00	2.65E+00	3.59E+00
Reduced Target SOF:	8.00E-01	U233	7.33E-02	1.9E+00		
Remaining SOF:	4.20E-01	I129 Generic	3.76E-05	1.0E-03		
		Np237	1.78E-03	4.8E-02		
		Tc99	1.88E-02	6.1E-01		
		C14	5.03E-02	2.7E+00		
		U234	1.49E-01	1.1E+01		
		U238	9.89E-02	7.4E+00		
		I129 F-Area Filtercake	3.60E-05	3.2E-03		
		Sr90	5.24E+00	5.1E+02		

Table B26 Engineered Trench, additional radionuclides are only Tritium, Target SOF Reduced to 0.700

Test Case	Target SOF = 0.700 Add Only Tritium									
	Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1									
	Primary Isotopes of Concern	**Engr. Trench #1 (Ci)**	**Engr. Trench PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**Adjusted Engr. Trench PA Limits (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Air Limit**
9.41E-01	H3	2.96E+00	6.3E+00	6.7E-01		4.2E+00	0.701	0.701		
7.33E-02	U233	7.33E-02	1.9E+00	6.7E-01		1.3E+00	0.058		0.058	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**0.988**	**0.803**	**0.185**	**0.0004**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00	2.02E+00	2.96E+00
Reduced Target SOF:	7.00E-01	U233	7.33E-02	1.9E+00		
Remaining SOF:	3.20E-01	I129 Generic	3.76E-05	1.0E-03		
		Np237	1.78E-03	4.8E-02		
		Tc99	1.88E-02	6.1E-01		
		C14	5.03E-02	2.7E+00		
		U234	1.49E-01	1.1E+01		
		U238	9.89E-02	7.4E+00		
		I129 F-Area Filtercake	3.60E-05	3.2E-03		
		Sr90	5.24E+00	5.1E+02		

Table B27 Engineered Trench, additional radionuclides are only Tritium, Target SOF Reduced to 0.750

Test Case — Target SOF = 0.750 Add Only Tritium

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	**Engr. Trench #1 (Ci)**	**Engr. Trench PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**Adjusted Engr. Trench PA Limits (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Air Limit**
9.41E-01	H3	3.27E+00	6.3E+00	6.7E-01		4.2E+00	0.775	0.775		
7.33E-02	U233	7.33E-02	1.9E+00	6.7E-01		1.3E+00	0.058		0.058	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**1.063**	**0.877**	**0.185**	**0.0004**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00	2.33E+00	3.27E+00
Reduced Target SOF:	7.50E-01	U233	7.33E-02	1.9E+00		
Remaining SOF:	3.70E-01	I129 Generic	3.76E-05	1.0E-03		
		Np237	1.78E-03	4.8E-02		
		Tc99	1.88E-02	6.1E-01		
		C14	5.03E-02	2.7E+00		
		U234	1.49E-01	1.1E+01		
		U238	9.89E-02	7.4E+00		
		I129 F-Area Filtercake	3.60E-05	3.2E-03		
		Sr90	5.24E+00	5.1E+02		

Table B28 Engineered Trench, additional radionuclides are only Tritium, Target SOF Reduced to 0.770

Test Case — Target SOF = 0.770 Add Only Tritium

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	Engr. Trench #1 (Ci)	Engr. Trench PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	Adjusted Engr. Trench PA Limits (Ci)	Fraction of Adjusted PA Limits	Fraction of Adjusted PA Early Well Limits	Fraction of Adjusted PA Late Well Limits	Fraction of Adjusted PA Air Limit
9.41E-01	H3	3.40E+00	6.3E+00	6.7E-01		4.2E+00	0.805	0.805		
7.33E-02	U233	7.33E-02	1.9E+00	6.7E-01		1.3E+00	0.058		0.058	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**1.093**	**0.907**	**0.185**	**0.0004**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00	2.46E+00	3.40E+00
Reduced Target SOF:	7.70E-01	U233	7.33E-02	1.9E+00		
Remaining SOF:	3.90E-01	I129 Generic	3.76E-05	1.0E-03		
		Np237	1.78E-03	4.8E-02		
		Tc99	1.88E-02	6.1E-01		
		C14	5.03E-02	2.7E+00		
		U234	1.49E-01	1.1E+01		
		U238	9.89E-02	7.4E+00		
		I129 F-Area Filtercake	3.60E-05	3.2E-03		
		Sr90	5.24E+00	5.1E+02		

Table B29 Engineered Trench, additional radionuclides are only Tritium, Target SOF Reduced to 0.760

Test Case — Target SOF = 0.760 Add Only Tritium

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	Engr. Trench #1 (Ci)	Engr. Trench PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	Adjusted Engr. Trench PA Limits (Ci)	Fraction of Adjusted PA Limits	Fraction of Adjusted PA Early Well Limits	Fraction of Adjusted PA Late Well Limits	Fraction of Adjusted PA Air Limit
9.41E-01	H3	3.33E+00	6.3E+00	6.7E-01		4.2E+00	0.790	0.790		
7.33E-02	U233	7.33E-02	1.9E+00	6.7E-01		1.3E+00	0.058		0.058	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**1.078**	**0.892**	**0.185**	**0.0004**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00	2.39E+00	3.33E+00
Reduced Target SOF:	7.60E-01	U233	7.33E-02	1.9E+00		
Remaining SOF:	3.80E-01	I129 Generic	3.76E-05	1.0E-03		
		Np237	1.78E-03	4.8E-02		
		Tc99	1.88E-02	6.1E-01		
		C14	5.03E-02	2.7E+00		
		U234	1.49E-01	1.1E+01		
		U238	9.89E-02	7.4E+00		
		I129 F-Area Filtercake	3.60E-05	3.2E-03		
		Sr90	5.24E+00	5.1E+02		

Table B30 Engineered Trench, additional radionuclides are only Tritium, Target SOF Reduced to 0.765

Test Case Target SOF = 0.765 Add Only Tritium

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	Engr. Trench #1 (Ci)	Engr. Trench PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	Adjusted Engr. Trench PA Limits (Ci)	Fraction of Adjusted PA Limits	Fraction of Adjusted PA Early Well Limits	Fraction of Adjusted PA Late Well Limits	Fraction of Adjusted PA Air Limit
9.41E-01	H3	3.37E+00	6.3E+00	6.7E-01		4.2E+00	0.798	0.798		
7.33E-02	U233	7.33E-02	1.9E+00	6.7E-01		1.3E+00	0.058		0.058	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**1.085**	**0.900**	**0.185**	**0.0004**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00	2.43E+00	3.37E+00
Reduced Target SOF:	7.65E-01	U233	7.33E-02	1.9E+00		
Remaining SOF:	3.85E-01	I129 Generic	3.76E-05	1.0E-03		
		Np237	1.78E-03	4.8E-02		
		Tc99	1.88E-02	6.1E-01		
		C14	5.03E-02	2.7E+00		
		U234	1.49E-01	1.1E+01		
		U238	9.89E-02	7.4E+00		
		I129 F-Area Filtercake	3.60E-05	3.2E-03		
		Sr90	5.24E+00	5.1E+02		

Table B31 Engineered Trench, additional radionuclides are only Late Well Radionuclides

Test Case Add Only Late Well

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	**Engr. Trench #1 (Ci)**	**Engr. Trench PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**Adjusted Engr. Trench PA Limits (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Air Limit**
9.41E-01	H3	9.41E-01	6.3E+00	6.7E-01		4.2E+00	0.223	0.223		
7.33E-02	U233	2.38E-01	1.9E+00	6.7E-01		1.3E+00	0.187		0.187	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	5.94E-03	4.8E-02	6.7E-01		3.2E-02	0.185		0.185	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.10E+00	1.1E+01	6.7E-01		7.4E+00	0.150		0.150	
9.89E-02	U238	7.40E-01	7.4E+00	6.7E-01		5.0E+00	0.149		0.149	
3.60E-05	I129 F-Area Filtercake	3.13E-04	3.2E-03	6.7E-01		2.1E-03	0.146		0.146	
5.24E+00	Sr90	4.94E+01	5.1E+02	6.7E-01		3.4E+02	0.145		0.145	
						Sum-of-Fractions	**1.287**	**0.325**	**0.961**	**0.0004**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00		
Current Target SOF:	9.00E-01	U233	7.33E-02	1.9E+00	1.65E-01	2.38E-01
Remaining SOF:	5.20E-01	I129 Generic	3.76E-05	1.0E-03		
		Np237	1.78E-03	4.8E-02	4.16E-03	5.94E-03
		Tc99	1.88E-02	6.1E-01		
		C14	5.03E-02	2.7E+00		
		U234	1.49E-01	1.1E+01	9.53E-01	1.10E+00
		U238	9.89E-02	7.4E+00	6.41E-01	7.40E-01
		I129 F-Area Filtercake	3.60E-05	3.2E-03	2.77E-04	3.13E-04
		Sr90	5.24E+00	5.1E+02	4.42E+01	4.94E+01

Table B32 Engineered Trench, additional radionuclides are only U-233

Test Case Add Only U-233

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	**Engr. Trench #1 (Ci)**	**Engr. Trench PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**Adjusted Engr. Trench PA Limits (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Air Limit**
9.41E-01	H3	9.41E-01	6.3E+00	6.7E-01		4.2E+00	0.223	0.223		
7.33E-02	U233	1.06E+00	1.9E+00	6.7E-01		1.3E+00	0.834		0.834	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**1.287**	**0.325**	**0.961**	**0.0004**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00		
Current Target SOF:	9.00E-01	U233	7.33E-02	1.9E+00	9.88E-01	1.06E+00
Remaining SOF:	5.20E-01	I129 Generic	3.76E-05	1.0E-03		
		Np237	1.78E-03	4.8E-02		
		Tc99	1.88E-02	6.1E-01		
		C14	5.03E-02	2.7E+00		
		U234	1.49E-01	1.1E+01		
		U238	9.89E-02	7.4E+00		
		I129 F-Area Filtercake	3.60E-05	3.2E-03		
		Sr90	5.24E+00	5.1E+02		

Table B33 Engineered Trench, additional radionuclides are only Np-237

Test Case Add Only Np -237

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	Engr. Trench #1 (Ci)	Engr. Trench PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	Adjusted Engr. Trench PA Limits (Ci)	Fraction of Adjusted PA Limits	Fraction of Adjusted PA Early Well Limits	Fraction of Adjusted PA Late Well Limits	Fraction of Adjusted PA Air Limit
9.41E-01	H3	9.41E-01	6.3E+00	6.7E-01		4.2E+00	0.223	0.223		
7.33E-02	U233	7.33E-02	1.9E+00	6.7E-01		1.3E+00	0.058		0.058	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	2.67E-02	4.8E-02	6.7E-01		3.2E-02	0.832		0.832	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**1.287**	**0.325**	**0.961**	**0.0004**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00		
Current Target SOF:	9.00E-01	U233	7.33E-02	1.9E+00		
Remaining SOF:	5.20E-01	I129 Generic	3.76E-05	1.0E-03		
		Np237	1.78E-03	4.8E-02	2.50E-02	2.67E-02
		Tc99	1.88E-02	6.1E-01		
		C14	5.03E-02	2.7E+00		
		U234	1.49E-01	1.1E+01		
		U238	9.89E-02	7.4E+00		
		I129 F-Area Filtercake	3.60E-05	3.2E-03		
		Sr90	5.24E+00	5.1E+02		

Table B34 Engineered Trench, additional radionuclides are only U-234

Test Case Add Only U-234

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	**Engr. Trench #1 (Ci)**	**Engr. Trench PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**Adjusted Engr. Trench PA Limits (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Air Limit**
9.41E-01	H3	9.41E-01	6.3E+00	6.7E-01		4.2E+00	0.223	0.223		
7.33E-02	U233	7.33E-02	1.9E+00	6.7E-01		1.3E+00	0.058		0.058	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	5.87E+00	1.1E+01	6.7E-01		7.4E+00	0.796		0.796	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**1.287**	**0.325**	**0.961**	**0.0004**

Current Total SOF: 3.80E-01

Current Target SOF: 9.00E-01

Remaining SOF: 5.20E-01

Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
H3	9.41E-01	6.3E+00		
U233	7.33E-02	1.9E+00		
I129 Generic	3.76E-05	1.0E-03		
Np237	1.78E-03	4.8E-02		
Tc99	1.88E-02	6.1E-01		
C14	5.03E-02	2.7E+00		
U234	1.49E-01	1.1E+01	5.72E+00	5.87E+00
U238	9.89E-02	7.4E+00		
I129 F-Area Filtercake	3.60E-05	3.2E-03		
Sr90	5.24E+00	5.1E+02		

Table B35 Engineered Trench, additional radionuclides are only U-238

Test Case Add Only U-238

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	Engr. Trench #1 (Ci)	Engr. Trench PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	Adjusted Engr. Trench PA Limits (Ci)	Fraction of Adjusted PA Limits	Fraction of Adjusted PA Early Well Limits	Fraction of Adjusted PA Late Well Limits	Fraction of Adjusted PA Air Limit
9.41E-01	H3	9.41E-01	6.3E+00	6.7E-01		4.2E+00	0.223	0.223		
7.33E-02	U233	7.33E-02	1.9E+00	6.7E-01		1.3E+00	0.058		0.058	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	3.95E+00	7.4E+00	6.7E-01		5.0E+00	0.796		0.796	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**1.287**	**0.325**	**0.961**	**0.0004**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00		
Current Target SOF:	9.00E-01	U233	7.33E-02	1.9E+00		
Remaining SOF:	5.20E-01	I129 Generic	3.76E-05	1.0E-03		
		Np237	1.78E-03	4.8E-02		
		Tc99	1.88E-02	6.1E-01		
		C14	5.03E-02	2.7E+00		
		U234	1.49E-01	1.1E+01		
		U238	9.89E-02	7.4E+00	3.85E+00	3.95E+00
		I129 F-Area Filtercake	3.60E-05	3.2E-03		
		Sr90	5.24E+00	5.1E+02		

Table B36 Engineered Trench, additional radionuclides are only I-129 on F-Area Filtercake

Test Case Add Only I-129 F-Area Filtercake

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	Engr. Trench #1 (Ci)	Engr. Trench PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	Adjusted Engr. Trench PA Limits (Ci)	Fraction of Adjusted PA Limits	Fraction of Adjusted PA Early Well Limits	Fraction of Adjusted PA Late Well Limits	Fraction of Adjusted PA Air Limit
9.41E-01	H3	9.41E-01	6.3E+00	6.7E-01		4.2E+00	0.223	0.223		
7.33E-02	U233	7.33E-02	1.9E+00	6.7E-01		1.3E+00	0.058		0.058	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	1.70E-03	3.2E-03	6.7E-01		2.1E-03	0.793		0.793	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**1.287**	**0.325**	**0.961**	**0.0004**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00		
Current Target SOF:	9.00E-01	U233	7.33E-02	1.9E+00		
Remaining SOF:	5.20E-01	I129 Generic	3.76E-05	1.0E-03		
		Np237	1.78E-03	4.8E-02		
		Tc99	1.88E-02	6.1E-01		
		C14	5.03E-02	2.7E+00		
		U234	1.49E-01	1.1E+01		
		U238	9.89E-02	7.4E+00		
		I129 F-Area Filtercake	3.60E-05	3.2E-03	1.66E-03	1.70E-03
		Sr90	5.24E+00	5.1E+02		

Table B37 Engineered Trench, additional radionuclides are only Sr-90

Test Case Add Only Sr-90

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	**Engr. Trench #1 (Ci)**	**Engr. Trench PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**Adjusted Engr. Trench PA Limits (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Air Limit**
9.41E-01	H3	9.41E-01	6.3E+00	6.7E-01		4.2E+00	0.223	0.223		
7.33E-02	U233	7.33E-02	1.9E+00	6.7E-01		1.3E+00	0.058		0.058	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	2.70E+02	5.1E+02	6.7E-01		3.4E+02	0.791		0.791	
						Sum-of-Fractions	**1.287**	**0.325**	**0.961**	**0.0004**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00		
Current Target SOF:	9.00E-01	U233	7.33E-02	1.9E+00		
Remaining SOF:	5.20E-01	I129 Generic	3.76E-05	1.0E-03		
		Np237	1.78E-03	4.8E-02		
		Tc99	1.88E-02	6.1E-01		
		C14	5.03E-02	2.7E+00		
		U234	1.49E-01	1.1E+01		
		U238	9.89E-02	7.4E+00		
		I129 F-Area Filtercake	3.60E-05	3.2E-03		
		Sr90	5.24E+00	5.1E+02	2.65E+02	2.70E+02

Table B38 Engineered Trench, additional radionuclides are only U-233, Target SOF Reduced to 0.800

Test Case Target SOF = 0.800 Add Only U-233

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	Engr. Trench #1 (Ci)	Engr. Trench PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	Adjusted Engr. Trench PA Limits (Ci)	Fraction of Adjusted PA Limits	Fraction of Adjusted PA Early Well Limits	Fraction of Adjusted PA Late Well Limits	Fraction of Adjusted PA Air Limit
9.41E-01	H3	9.41E-01	6.3E+00	6.7E-01		4.2E+00	0.223	0.223		
7.33E-02	U233	8.71E-01	1.9E+00	6.7E-01		1.3E+00	0.684		0.684	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**1.138**	**0.325**	**0.812**	**0.0004**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00		
Reduced Target SOF:	8.00E-01	U233	7.33E-02	1.9E+00	7.98E-01	8.71E-01
Remaining SOF:	4.20E-01	I129 Generic	3.76E-05	1.0E-03		
		Np237	1.78E-03	4.8E-02		
		Tc99	1.88E-02	6.1E-01		
		C14	5.03E-02	2.7E+00		
		U234	1.49E-01	1.1E+01		
		U238	9.89E-02	7.4E+00		
		I129 F-Area Filtercake	3.60E-05	3.2E-03		
		Sr90	5.24E+00	5.1E+02		

Table B39 Engineered Trench, additional radionuclides are only U-233, Target SOF Reduced to 0.850

Test Case Target SOF = 0.850 Add Only U-233

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	**Engr. Trench #1 (Ci)**	**Engr. Trench PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**Adjusted Engr. Trench PA Limits (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Air Limit**
9.41E-01	H3	9.41E-01	6.3E+00	6.7E-01		4.2E+00	0.223	0.223		
7.33E-02	U233	9.66E-01	1.9E+00	6.7E-01		1.3E+00	0.759		0.759	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**1.212**	**0.325**	**0.887**	**0.0004**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00		
Reduced Target SOF:	8.50E-01	U233	7.33E-02	1.9E+00	8.93E-01	9.66E-01
Remaining SOF:	4.70E-01	I129 Generic	3.76E-05	1.0E-03		
		Np237	1.78E-03	4.8E-02		
		Tc99	1.88E-02	6.1E-01		
		C14	5.03E-02	2.7E+00		
		U234	1.49E-01	1.1E+01		
		U238	9.89E-02	7.4E+00		
		I129 F-Area Filtercake	3.60E-05	3.2E-03		
		Sr90	5.24E+00	5.1E+02		

Table B40 Engineered Trench, additional radionuclides are only U-233, Target SOF Reduced to 0.870

Test Case Target SOF = 0.870 Add Only U-233

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	**Engr. Trench #1 (Ci)**	**Engr. Trench PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**Adjusted Engr. Trench PA Limits (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Air Limit**
9.41E-01	H3	9.41E-01	6.3E+00	6.7E-01		4.2E+00	0.223	0.223		
7.33E-02	U233	1.00E+00	1.9E+00	6.7E-01		1.3E+00	0.789		0.789	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**1.242**	**0.325**	**0.917**	**0.0004**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00		
Reduced Target SOF:	8.70E-01	U233	7.33E-02	1.9E+00	9.31E-01	1.00E+00
Remaining SOF:	4.90E-01	I129 Generic	3.76E-05	1.0E-03		
		Np237	1.78E-03	4.8E-02		
		Tc99	1.88E-02	6.1E-01		
		C14	5.03E-02	2.7E+00		
		U234	1.49E-01	1.1E+01		
		U238	9.89E-02	7.4E+00		
		I129 F-Area Filtercake	3.60E-05	3.2E-03		
		Sr90	5.24E+00	5.1E+02		

Table B41 Engineered Trench, additional radionuclides are only U-233, Target SOF Reduced to 0.865

Test Case Target SOF = 0.865 Add Only U-233

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	**Engr. Trench #1 (Ci)**	**Engr. Trench PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**Adjusted Engr. Trench PA Limits (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Air Limit**
9.41E-01	H3	9.41E-01	6.3E+00	6.7E-01		4.2E+00	0.223	0.223		
7.33E-02	U233	9.95E-01	1.9E+00	6.7E-01		1.3E+00	0.781		0.781	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**1.235**	**0.325**	**0.909**	**0.0004**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00		
Reduced Target SOF:	8.65E-01	U233	7.33E-02	1.9E+00	9.22E-01	9.95E-01
Remaining SOF:	4.85E-01	I129 Generic	3.76E-05	1.0E-03		
		Np237	1.78E-03	4.8E-02		
		Tc99	1.88E-02	6.1E-01		
		C14	5.03E-02	2.7E+00		
		U234	1.49E-01	1.1E+01		
		U238	9.89E-02	7.4E+00		
		I129 F-Area Filtercake	3.60E-05	3.2E-03		
		Sr90	5.24E+00	5.1E+02		

Table B42 Engineered Trench, additional radionuclides are only U-233, Target SOF Reduced to 0.862

Test Case Target SOF = 0.862 Add Only U-233

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	**Engr. Trench #1 (Ci)**	**Engr. Trench PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**Adjusted Engr. Trench PA Limits (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Air Limit**
9.41E-01	H3	9.41E-01	6.3E+00	6.7E-01		4.2E+00	0.223	0.223		
7.33E-02	U233	9.89E-01	1.9E+00	6.7E-01		1.3E+00	0.777		0.777	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**1.230**	**0.325**	**0.905**	**0.0004**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00		
Reduced Target SOF:	8.62E-01	U233	7.33E-02	1.9E+00	9.16E-01	9.89E-01
Remaining SOF:	4.82E-01	I129 Generic	3.76E-05	1.0E-03		
		Np237	1.78E-03	4.8E-02		
		Tc99	1.88E-02	6.1E-01		
		C14	5.03E-02	2.7E+00		
		U234	1.49E-01	1.1E+01		
		U238	9.89E-02	7.4E+00		
		I129 F-Area Filtercake	3.60E-05	3.2E-03		
		Sr90	5.24E+00	5.1E+02		

Table B43 Engineered Trench, additional radionuclides are only U-233, Target SOF Reduced to 0.861

Test Case Target SOF = 0.861 Add Only U-233

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	**Engr. Trench #1 (Ci)**	**Engr. Trench PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**Adjusted Engr. Trench PA Limits (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Air Limit**
9.41E-01	H3	9.41E-01	6.3E+00	6.7E-01		4.2E+00	0.223	0.223		
7.33E-02	U233	9.87E-01	1.9E+00	6.7E-01		1.3E+00	0.776		0.776	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**1.229**	**0.325**	**0.903**	**0.0004**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00		
Reduced Target SOF:	8.61E-01	U233	7.33E-02	1.9E+00	9.14E-01	9.87E-01
Remaining SOF:	4.81E-01	I129 Generic	3.76E-05	1.0E-03		
		Np237	1.78E-03	4.8E-02		
		Tc99	1.88E-02	6.1E-01		
		C14	5.03E-02	2.7E+00		
		U234	1.49E-01	1.1E+01		
		U238	9.89E-02	7.4E+00		
		I129 F-Area Filtercake	3.60E-05	3.2E-03		
		Sr90	5.24E+00	5.1E+02		

Table B44 Engineered Trench, additional radionuclides are only U-233, Target SOF Reduced to 0.860

Test Case Target SOF = 0.860 Add Only U-233

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	Engr. Trench #1 (Ci)	Engr. Trench PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	Adjusted Engr. Trench PA Limits (Ci)	Fraction of Adjusted PA Limits	Fraction of Adjusted PA Early Well Limits	Fraction of Adjusted PA Late Well Limits	Fraction of Adjusted PA Air Limit
9.41E-01	H3	9.41E-01	6.3E+00	6.7E-01		4.2E+00	0.223	0.223		
7.33E-02	U233	9.85E-01	1.9E+00	6.7E-01		1.3E+00	0.774		0.774	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**1.227**	**0.325**	**0.902**	**0.0004**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00		
Reduced Target SOF:	8.60E-01	U233	7.33E-02	1.9E+00	9.12E-01	9.85E-01
Remaining SOF:	4.80E-01	I129 Generic	3.76E-05	1.0E-03		
		Np237	1.78E-03	4.8E-02		
		Tc99	1.88E-02	6.1E-01		
		C14	5.03E-02	2.7E+00		
		U234	1.49E-01	1.1E+01		
		U238	9.89E-02	7.4E+00		
		I129 F-Area Filtercake	3.60E-05	3.2E-03		
		Sr90	5.24E+00	5.1E+02		

Table B45 Engineered Trench, additional radionuclides are only U-233, Target SOF Reduced to 0.859

Test Case Target SOF = 0.859 Add Only U-233

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	**Engr. Trench #1 (Ci)**	**Engr. Trench PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**Adjusted Engr. Trench PA Limits (Ci)**	**Fraction of Adjusted PA Limits**	**Fraction of Adjusted PA Early Well Limits**	**Fraction of Adjusted PA Late Well Limits**	**Fraction of Adjusted PA Air Limit**
9.41E-01	H3	9.41E-01	6.3E+00	6.7E-01		4.2E+00	0.223	0.223		
7.33E-02	U233	9.83E-01	1.9E+00	6.7E-01		1.3E+00	0.773		0.773	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**1.226**	**0.325**	**0.900**	**0.0004**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00		
Reduced Target SOF:	8.59E-01	U233	7.33E-02	1.9E+00	9.10E-01	9.83E-01
Remaining SOF:	4.79E-01	I129 Generic	3.76E-05	1.0E-03		
		Np237	1.78E-03	4.8E-02		
		Tc99	1.88E-02	6.1E-01		
		C14	5.03E-02	2.7E+00		
		U234	1.49E-01	1.1E+01		
		U238	9.89E-02	7.4E+00		
		I129 F-Area Filtercake	3.60E-05	3.2E-03		
		Sr90	5.24E+00	5.1E+02		

Table B46 Engineered Trench, additional radionuclides are only U-233, Target SOF Reduced to 0.858

Test Case Target SOF = 0.858 Add Only U-233

Table 5 Estimated Aggregate Effects of Studies on Engineered Trench #1

	Primary Isotopes of Concern	Engr. Trench #1 (Ci)	Engr. Trench PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	Adjusted Engr. Trench PA Limits (Ci)	Fraction of Adjusted PA Limits	Fraction of Adjusted PA Early Well Limits	Fraction of Adjusted PA Late Well Limits	Fraction of Adjusted PA Air Limit
9.41E-01	H3	9.41E-01	6.3E+00	6.7E-01		4.2E+00	0.223	0.223		
7.33E-02	U233	9.82E-01	1.9E+00	6.7E-01		1.3E+00	0.771		0.771	
3.76E-05	I129 Generic	3.76E-05	1.0E-03	6.7E-01		6.7E-04	0.056	0.056		
1.78E-03	Np237	1.78E-03	4.8E-02	6.7E-01		3.2E-02	0.055		0.055	
1.88E-02	Tc99	1.88E-02	6.1E-01	6.7E-01		4.1E-01	0.046	0.046		
5.03E-02	C14	5.03E-02	2.7E+00		5.0E+01	1.4E+02	0.0004			0.0004
1.49E-01	U234	1.49E-01	1.1E+01	6.7E-01		7.4E+00	0.020		0.020	
9.89E-02	U238	9.89E-02	7.4E+00	6.7E-01		5.0E+00	0.020		0.020	
3.60E-05	I129 F-Area Filtercake	3.60E-05	3.2E-03	6.7E-01		2.1E-03	0.017		0.017	
5.24E+00	Sr90	5.24E+00	5.1E+02	6.7E-01		3.4E+02	0.015		0.015	
						Sum-of-Fractions	**1.224**	**0.325**	**0.899**	**0.0004**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	3.80E-01	H3	9.41E-01	6.3E+00		
Reduced Target SOF:	8.58E-01	U233	7.33E-02	1.9E+00	9.08E-01	9.82E-01
Remaining SOF:	4.78E-01	I129 Generic	3.76E-05	1.0E-03		
		Np237	1.78E-03	4.8E-02		
		Tc99	1.88E-02	6.1E-01		
		C14	5.03E-02	2.7E+00		
		U234	1.49E-01	1.1E+01		
		U238	9.89E-02	7.4E+00		
		I129 F-Area Filtercake	3.60E-05	3.2E-03		
		Sr90	5.24E+00	5.1E+02		

Table B47 Component-In-Grout Trench, no additional radionuclides

Test Case Base Case

Table 8 Estimated Aggregate Effects of Studies on Component-In-Grout Trench, using Revised Limits

	Significant Isotopes	CIG Trench (Ci)	Revised CIG Trench SA Limit (Ci)	Fraction of Revised SA Limit	Fraction of Revised SA Early Well Groundwater Limit	Fraction of Revised SA Late Well Groundwater Limit	Fraction of Revised SA Resident Limit
4.16E-06	I-129	4.16E-06	6.1E-04	0.00682	0.00682		
1.67E-02	Pu-240	1.67E-02	2.7E+00	0.00619		0.00619	
4.99E-04	Np-237	4.99E-04	3.7E-01	0.00135		0.00135	
2.01E+03	Cs-137	2.01E+03	2.2E+06	0.00091			0.00091
2.11E-04	Tc-99	2.11E-04	3.8E-01	0.00056	0.00056		
2.15E-02	C-14	2.15E-02	5.7E+01	0.00038	0.00038		
			Sum-of-Fractions	**0.016**	**0.008**	**0.008**	**0.00091**

		Nuclides	Current Ci	Revised Limit	Limit Fraction
Current Total SOF:	2.10E-02	I-129	4.16E-06	6.1E-04	6.82E-03
Current Target SOF:	9.50E-01	Pu-240	1.67E-02	2.7E+00	6.19E-03
Remaining SOF:	9.29E-01	Np-237	4.99E-04	3.7E-01	1.35E-03
		Cs-137	2.01E+03	2.2E+06	9.14E-04
		Tc-99	2.11E-04	3.8E-01	5.55E-04
		C-14	2.15E-02	5.7E+01	3.77E-04
				SOF	1.62E-02

Table B48 Component-In-Grout Trench, additional radionuclides are same distribution as those already disposed

Test Case Same Distribution

Table 8 Estimated Aggregate Effects of Studies on Component-In-Grout Trench, using Revised Limits

	Significant Isotopes	**CIG Trench (Ci)**	**Revised CIG Trench SA Limit (Ci)**	**Fraction of Revised SA Limit**	**Fraction of Revised SA Early Well Groundwater Limit**	**Fraction of Revised SA Late Well Groundwater Limit**	**Fraction of Revised SA Resident Limit**
4.16E-06	I-129	2.43E-04	6.1E-04	0.39799	0.39799		
1.67E-02	Pu-240	9.74E-01	2.7E+00	0.36084		0.36084	
4.99E-04	Np-237	2.91E-02	3.7E-01	0.07868		0.07868	
2.01E+03	Cs-137	1.17E+05	2.2E+06	0.05330			0.05330
2.11E-04	Tc-99	1.23E-02	3.8E-01	0.03239	0.03239		
2.15E-02	C-14	1.25E+00	5.7E+01	0.02201	0.02201		
			Sum-of-Fractions	**0.945**	**0.452**	**0.440**	**0.05330**

		Nuclides	Current Ci	Revised Limit	Limit Fraction	Fraction of SOF	Add Fraction	Add Ci	New Total Ci
Current Total SOF:	2.10E-02								
Current Target SOF:	9.50E-01	I-129	4.16E-06	6.1E-04	6.82E-03	4.21E-01	3.91E-01	2.39E-04	2.43E-04
Remaining SOF:	9.29E-01	Pu-240	1.67E-02	2.7E+00	6.19E-03	3.82E-01	3.55E-01	9.58E-01	9.74E-01
		Np-237	4.99E-04	3.7E-01	1.35E-03	8.32E-02	7.73E-02	2.86E-02	2.91E-02
		Cs-137	2.01E+03	2.2E+06	9.14E-04	5.64E-02	5.24E-02	1.15E+05	1.17E+05
		Tc-99	2.11E-04	3.8E-01	5.55E-04	3.43E-02	3.18E-02	1.21E-02	1.23E-02
		C-14	2.15E-02	5.7E+01	3.77E-04	2.33E-02	2.16E-02	1.23E+00	1.25E+00
				SOF	1.62E-02	1.00E+00	9.29E-01		

Table B49 Component-In-Grout Trench, additional radionuclides are only I-129

Test Case Add Only I-129

Table 8 Estimated Aggregate Effects of Studies on Component-In-Grout Trench, using Revised Limits

	Significant Isotopes	**CIG Trench (Ci)**	**Revised CIG Trench SA Limit (Ci)**	**Fraction of Revised SA Limit**	**Fraction of Revised SA Early Well Groundwater Limit**	**Fraction of Revised SA Late Well Groundwater Limit**	**Fraction of Revised SA Resident Limit**
4.16E-06	I-129	5.71E-04	6.1E-04	0.93582	0.93582		
1.67E-02	Pu-240	1.67E-02	2.7E+00	0.00619		0.00619	
4.99E-04	Np-237	4.99E-04	3.7E-01	0.00135		0.00135	
2.01E+03	Cs-137	2.01E+03	2.2E+06	0.00091			0.00091
2.11E-04	Tc-99	2.11E-04	3.8E-01	0.00056	0.00056		
2.15E-02	C-14	2.15E-02	5.7E+01	0.00038	0.00038		
			Sum-of-Fractions	**0.945**	**0.937**	**0.008**	**0.00091**

		Nuclides	Current Ci	Revised Limit	Add Ci	New Total Ci
Current Total SOF:	2.10E-02					
Current Target SOF:	9.50E-01	I-129	4.16E-06	6.1E-04	5.67E-04	5.71E-04
Remaining SOF:	9.29E-01	Pu-240	1.67E-02	2.7E+00		
		Np-237	4.99E-04	3.7E-01		
		Cs-137	2.01E+03	2.2E+06		
		Tc-99	2.11E-04	3.8E-01		
		C-14	2.15E-02	5.7E+01		

Table B50 Component-In-Grout Trench, additional radionuclides are only Early Well Radionuclides

Test Case Add Only Early Well

Table 8 Estimated Aggregate Effects of Studies on Component-In-Grout Trench, using Revised Limits

	Significant Isotopes	CIG Trench (Ci)	Revised CIG Trench SA Limit (Ci)	Fraction of Revised SA Limit	Fraction of Revised SA Early Well Groundwater Limit	Fraction of Revised SA Late Well Groundwater Limit	Fraction of Revised SA Resident Limit
4.16E-06	I-129	1.93E-04	6.1E-04	0.31649	0.31649		
1.67E-02	Pu-240	1.67E-02	2.7E+00	0.00619		0.00619	
4.99E-04	Np-237	4.99E-04	3.7E-01	0.00135		0.00135	
2.01E+03	Cs-137	2.01E+03	2.2E+06	0.00091			0.00091
2.11E-04	Tc-99	1.18E-01	3.8E-01	0.31022	0.31022		
2.15E-02	C-14	1.77E+01	5.7E+01	0.31004	0.31004		
			Sum-of-Fractions	**0.945**	**0.937**	**0.008**	**0.00091**

		Nuclides	Current Ci	Revised Limit	Add Ci	New Total Ci
Current Total SOF:	2.10E-02					
Current Target SOF:	9.50E-01	I-129	4.16E-06	6.1E-04	1.89E-04	1.93E-04
Remaining SOF:	9.29E-01	Pu-240	1.67E-02	2.7E+00		
		Np-237	4.99E-04	3.7E-01		
		Cs-137	2.01E+03	2.2E+06		
		Tc-99	2.11E-04	3.8E-01	1.18E-01	1.18E-01
		C-14	2.15E-02	5.7E+01	1.77E+01	1.77E+01

Table B51 Component-In-Grout Trench, additional radionuclides are only Late Well Radionuclides

Test Case Add Only Late Well

Table 8 Estimated Aggregate Effects of Studies on Component-In-Grout Trench, using Revised Limits

	Significant Isotopes	**CIG Trench (Ci)**	**Revised CIG Trench SA Limit (Ci)**	**Fraction of Revised SA Limit**	**Fraction of Revised SA Early Well Groundwater Limit**	**Fraction of Revised SA Late Well Groundwater Limit**	**Fraction of Revised SA Resident Limit**
4.16E-06	I-129	4.16E-06	6.1E-04	0.00682	0.00682		
1.67E-02	Pu-240	1.27E+00	2.7E+00	0.47069		0.47069	
4.99E-04	Np-237	1.72E-01	3.7E-01	0.46585		0.46585	
2.01E+03	Cs-137	2.01E+03	2.2E+06	0.00091			0.00091
2.11E-04	Tc-99	2.11E-04	3.8E-01	0.00056	0.00056		
2.15E-02	C-14	2.15E-02	5.7E+01	0.00038	0.00038		
			Sum-of-Fractions	**0.945**	**0.008**	**0.937**	**0.00091**

		Nuclides	Current Ci	Revised Limit	Add Ci	New Total Ci
Current Total SOF:	2.10E-02					
Current Target SOF:	9.50E-01	I-129	4.16E-06	6.1E-04		
Remaining SOF:	9.29E-01	Pu-240	1.67E-02	2.7E+00	1.25E+00	1.27E+00
		Np-237	4.99E-04	3.7E-01	1.72E-01	1.72E-01
		Cs-137	2.01E+03	2.2E+06		
		Tc-99	2.11E-04	3.8E-01		
		C-14	2.15E-02	5.7E+01		

Table B52 Low Activity Waste Vault, no additional radionuclides

Test Case Base Case

Table 9 Estimated Aggregate Effects of Studies on Low Activity Waste Vault

	Primary Isotopes of Concern	LAW Vault (Ci)	LAW Vault PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Less Conservative Air Analysis	Adjusted LAW Vault PA Limit (Ci)	Fraction of Adjusted PA Limit	Fraction of Adjusted PA Late Well Limit	Fraction of PA Agriculture Limit	Fraction of Adjusted PA Air Limit	Fraction of PA Radon Limit
1.62E-04	I129 Generic	1.62E-04	1.2E-03			1.2E-03	0.135	0.135			
1.54E-01	C14	1.54E-01	2.7E+00		5.0E+01	1.4E+02	0.001			0.001	
3.71E+00	U234	3.71E+00	1.2E+02			1.2E+02	0.031				0.031
1.00E-01	Tc99	1.00E-01	6.0E+00			6.0E+00	0.017	0.017			
5.05E-01	U233	5.05E-01	4.5E+01			4.5E+01	0.011		0.011		
1.95E+00	Pu239	1.95E+00	1.8E+02			1.8E+02	0.011		0.011		
						Sum-of-Fractions	**0.206**	**0.152**	**0.022**	**0.001**	**0.031**

		Nuclide	Current Ci	Current Limit
Current Total SOF:	2.95E-01	I129 Generic	1.62E-04	1.20E-03
Current Target SOF:	1.00E+00	C14	1.54E-01	2.70E+00
Remaining SOF:	7.05E-01	U234	3.71E+00	1.20E+02
		Tc99	1.00E-01	6.00E+00
		U233	5.05E-01	4.50E+01
		Pu239	1.95E+00	1.80E+02

Table B53 Low Activity Waste Vault, additional radionuclides have the same distribution as those already disposed

Test Case Same Distribution

Table 9 Estimated Aggregate Effects of Studies on Low Activity Waste Vault

	Primary Isotopes of Concern	**LAW Vault (Ci)**	**LAW Vault PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**Adjusted LAW Vault PA Limit (Ci)**	**Fraction of Adjusted PA Limit**	**Fraction of Adjusted PA Late Well Limit**	**Fraction of PA Agriculture Limit**	**Fraction of Adjusted PA Air Limit**	**Fraction of PA Radon Limit**
1.62E-04	I129 Generic	5.99E-04	1.2E-03			1.2E-03	0.499	0.499			
1.54E-01	C14	5.70E-01	2.7E+00		5.0E+01	1.4E+02	0.004			0.004	
3.71E+00	U234	1.37E+01	1.2E+02			1.2E+02	0.114				0.114
1.00E-01	Tc99	3.69E-01	6.0E+00			6.0E+00	0.061	0.061			
5.05E-01	U233	1.86E+00	4.5E+01			4.5E+01	0.041		0.041		
1.95E+00	Pu239	7.18E+00	1.8E+02			1.8E+02	0.040		0.040		
						Sum-of-Fractions	**0.760**	**0.561**	**0.081**	**0.004**	**0.114**

		Nuclide	Current Ci	Current Limit	Limit Fract	Fract SOF	Add Fract	Add Ci	New Total Ci
Current Total SOF:	2.95E-01	I129 Generic	1.62E-04	1.20E-03	1.35E-01	5.16E-01	3.64E-01	4.37E-04	5.99E-04
Current Target SOF:	1.00E+00	C14	1.54E-01	2.70E+00	5.72E-02	2.18E-01	1.54E-01	4.15E-01	5.70E-01
Remaining SOF:	7.05E-01	U234	3.71E+00	1.20E+02	3.09E-02	1.18E-01	8.31E-02	9.98E+00	1.37E+01
		Tc99	1.00E-01	6.00E+00	1.67E-02	6.36E-02	4.48E-02	2.69E-01	3.69E-01
		U233	5.05E-01	4.50E+01	1.12E-02	4.29E-02	3.02E-02	1.36E+00	1.86E+00
		Pu239	1.95E+00	1.80E+02	1.08E-02	4.12E-02	2.91E-02	5.23E+00	7.18E+00
				SOF	2.62E-01	1.00E+00			

Table B54 Low Activity Waste Vault, additional radionuclides are only I-129

Test Case Add Only I-129

Table 9 Estimated Aggregate Effects of Studies on Low Activity Waste Vault

	Primary Isotopes of Concern	**LAW Vault (Ci)**	**LAW Vault PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Less Conservative Air Analysis**	**Adjusted LAW Vault PA Limit (Ci)**	**Fraction of Adjusted PA Limit**	**Fraction of Adjusted PA Late Well Limit**	**Fraction of PA Agriculture Limit**	**Fraction of Adjusted PA Air Limit**	**Fraction of PA Radon Limit**
1.62E-04	I129 Generic	1.01E-03	1.2E-03			1.2E-03	0.840	0.840			
1.54E-01	C14	1.54E-01	2.7E+00		5.0E+01	1.4E+02	0.001			0.001	
3.71E+00	U234	3.71E+00	1.2E+02			1.2E+02	0.031				0.031
1.00E-01	Tc99	1.00E-01	6.0E+00			6.0E+00	0.017	0.017			
5.05E-01	U233	5.05E-01	4.5E+01			4.5E+01	0.011		0.011		
1.95E+00	Pu239	1.95E+00	1.8E+02			1.8E+02	0.011		0.011		
						Sum-of-Fractions	**0.911**	**0.857**	**0.022**	**0.001**	**0.031**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	2.95E-01	I129 Generic	1.62E-04	1.20E-03	8.46E-04	1.01E-03
Current Target SOF:	1.00E+00	C14	1.54E-01	2.70E+00		
Remaining SOF:	7.05E-01	U234	3.71E+00	1.20E+02		
		Tc99	1.00E-01	6.00E+00		
		U233	5.05E-01	4.50E+01		
		Pu239	1.95E+00	1.80E+02		

Table B55 Intermediate Level Vault, no additional radionuclides

Test Case Base Case

Table 11 Estimated Aggregate Effects of Studies on Intermediate Level Vault, Including K&L Basin Resins

	Primary Isotopes of Concern	IL Vault (Ci)	IL Vault PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Artificial Dilution	Adjusted ILV PA Limits (Ci)	Fraction of Adjusted ILV PA Limits	Fraction of Adjusted PA Late Well Limit	Fraction of PA Resident Limit	Fraction of PA Air Limit	Fraction of PA Radon Limit
4.08E-01	C14	4.08E-01	2.7E+00			2.7E+00	0.151			0.151	
4.28E-05	I129 Generic	4.28E-05	5.2E-04	4.5E-01	4.0E-01	9.3E-05	0.462	0.462			
7.24E-06	I129 K&L Basin Resins	7.24E-06	8.8E-01	4.5E-01	4.0E-01	1.6E-01	0.00005	0.00005			
1.12E-01	U233 Depleted	1.12E-01	7.0E+00			7.0E+00	0.016		0.016		
2.37E-01	U234	2.37E-01	1.5E+01			1.5E+01	0.016				0.016
1.99E-03	I129 Activated Carbon	1.99E-03	1.4E-01	4.5E-01	4.0E-01	2.5E-02	0.080	0.080			
5.75E-01	U238	5.75E-01	4.9E+01			4.9E+01	0.012		0.012		
						Sum-of-Fractions	0.737	0.542	0.028	0.151	0.016

		Nuclide	Current Ci	Current Limit
Current Total SOF:	0.325	C14	4.08E-01	2.70E+00
Current Target SOF:	0.950	I129 Generic	4.28E-05	5.20E-04
Remaining SOF:	0.625	I129 K&L Basin Resins	7.24E-06	8.79E-01
		U233 Depleted	1.12E-01	7.00E+00
		U234	2.37E-01	1.50E+01
		I129 Activated Carbon	1.99E-03	1.40E-01
		U238	5.75E-01	4.90E+01

Table B56 Intermediate Level Vault, additional radionuclides have same distribution as those already disposed

Test Case Same Distribution

Table 11 Estimated Aggregate Effects of Studies on Intermediate Level Vault, Including K&L Basin Resins

	Primary Isotopes of Concern	**IL Vault (Ci)**	**IL Vault PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Artificial Dilution**	**Adjusted ILV PA Limits (Ci)**	**Fraction of Adjusted ILV PA Limits**	**Fraction of Adjusted PA Late Well Limit**	**Fraction of PA Resident Limit**	**Fraction of PA Air Limit**	**Fraction of PA Radon Limit**
4.08E-01	C14	1.28E+00	2.7E+00			2.7E+00	0.476			0.476	
4.28E-05	I129 Generic	1.35E-04	5.2E-04	4.5E-01	4.0E-01	9.3E-05	1.454	1.454			
7.24E-06	I129 K&L Basin Resins	2.28E-05	8.8E-01	4.5E-01	4.0E-01	1.6E-01	0.00015	0.00015			
1.12E-01	U233 Depleted	3.52E-01	7.0E+00			7.0E+00	0.050		0.050		
2.37E-01	U234	7.46E-01	1.5E+01			1.5E+01	0.050				0.050
1.99E-03	I129 Activated Carbon	6.27E-03	1.4E-01	4.5E-01	4.0E-01	2.5E-02	0.252	0.252			
5.75E-01	U238	1.81E+00	4.9E+01			4.9E+01	0.037		0.037		
						Sum-of-Fractions	2.318	1.706	0.087	0.476	0.050

		Nuclide	Current Ci	Current Limit	Limit Fract	Fract SOF	Add Fract	Add Ci	New Total Ci
Current Total SOF:	0.325	C14	4.08E-01	2.70E+00	1.51E-01	5.19E-01	3.24E-01	8.76E-01	1.28E+00
Current Target SOF:	0.950	I129 Generic	4.28E-05	5.20E-04	8.22E-02	2.82E-01	1.77E-01	9.18E-05	1.35E-04
Remaining SOF:	0.625	I129 K&L Basin Resins	7.24E-06	8.79E-01	8.24E-06	2.83E-05	1.77E-05	1.55E-05	2.28E-05
		U233 Depleted	1.12E-01	7.00E+00	1.60E-02	5.50E-02	3.43E-02	2.40E-01	3.52E-01
		U234	2.37E-01	1.50E+01	1.58E-02	5.43E-02	3.39E-02	5.09E-01	7.46E-01
		I129 Activated Carbon	1.99E-03	1.40E-01	1.42E-02	4.89E-02	3.05E-02	4.28E-03	6.27E-03
		U238	5.75E-01	4.90E+01	1.17E-02	4.03E-02	2.52E-02	1.23E+00	1.81E+00
				SOF	2.91E-01	1.00E+00			

Table B57 Intermediate Level Vault, additional radionuclides are only I-129

Test Case Add Only I-129

Table 11 Estimated Aggregate Effects of Studies on Intermediate Level Vault, Including K&L Basin Resins

	Primary Isotopes of Concern	**IL Vault (Ci)**	**IL Vault PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Artificial Dilution**	**Adjusted ILV PA Limits (Ci)**	**Fraction of Adjusted ILV PA Limits**	**Fraction of Adjusted PA Late Well Limit**	**Fraction of PA Resident Limit**	**Fraction of PA Air Limit**	**Fraction of PA Radon Limit**
4.08E-01	C14	4.08E-01	2.7E+00			2.7E+00	0.151			0.151	
4.28E-05	I129 Generic	3.68E-04	5.2E-04	4.5E-01	4.0E-01	9.3E-05	3.974	3.974			
7.24E-06	I129 K&L Basin Resins	7.24E-06	8.8E-01	4.5E-01	4.0E-01	1.6E-01	0.00005	0.00005			
1.12E-01	U233 Depleted	1.12E-01	7.0E+00			7.0E+00	0.016		0.016		
2.37E-01	U234	2.37E-01	1.5E+01			1.5E+01	0.016				0.016
1.99E-03	I129 Activated Carbon	1.99E-03	1.4E-01	4.5E-01	4.0E-01	2.5E-02	0.080	0.080			
5.75E-01	U238	5.75E-01	4.9E+01			4.9E+01	0.012		0.012		
						Sum-of-Fractions	4.248	4.054	0.028	0.151	0.016

		Nuclide	Current Ci	Current Limit	Add Ci	New total Ci
Current Total SOF:	0.325	C14	4.08E-01	2.70E+00		
Current Target SOF:	0.950	I129 Generic	4.28E-05	5.20E-04	3.25E-04	3.68E-04
Remaining SOF:	0.625	I129 K&L Basin Resins	7.24E-06	8.79E-01		
		U233 Depleted	1.12E-01	7.00E+00		
		U234	2.37E-01	1.50E+01		
		I129 Activated Carbon	1.99E-03	1.40E-01		
		U238	5.75E-01	4.90E+01		

Table B58 Intermediate Level Vault, additional radionuclides have the same distribution as those already disposed, Target SOF Reduced to 0.500

Test Case Reduce Target SOF to 0.500 Same Distribution

Table 11 Estimated Aggregate Effects of Studies on Intermediate Level Vault, Including K&L Basin Resins

	Primary Isotopes of Concern	**IL Vault (Ci)**	**IL Vault PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Artificial Dilution**	**Adjusted ILV PA Limits (Ci)**	**Fraction of Adjusted ILV PA Limits**	**Fraction of Adjusted PA Late Well Limit**	**Fraction of PA Resident Limit**	**Fraction of PA Air Limit**	**Fraction of PA Radon Limit**
4.08E-01	C14	6.53E-01	2.7E+00			2.7E+00	0.242			0.242	
4.28E-05	I129 Generic	6.85E-05	5.2E-04	4.5E-01	4.0E-01	9.3E-05	0.740	0.740			
7.24E-06	I129 K&L Basin Resins	1.16E-05	8.8E-01	4.5E-01	4.0E-01	1.6E-01	0.00007	0.00007			
1.12E-01	U233 Depleted	1.79E-01	7.0E+00			7.0E+00	0.026		0.026		
2.37E-01	U234	3.80E-01	1.5E+01			1.5E+01	0.025				0.025
1.99E-03	I129 Activated Carbon	3.19E-03	1.4E-01	4.5E-01	4.0E-01	2.5E-02	0.128	0.128			
5.75E-01	U238	9.20E-01	4.9E+01			4.9E+01	0.019		0.019		
						Sum-of-Fractions	1.180	0.868	0.044	0.242	0.025

		Nuclide	Current Ci	Current Limit	Limit Fract	Fract SOF	Add Fract	Add Ci	New Total Ci
Current Total SOF:	0.325	C14	4.08E-01	2.70E+00	1.51E-01	5.19E-01	9.08E-02	2.45E-01	6.53E-01
Reduced Target SOF:	0.500	I129 Generic	4.28E-05	5.20E-04	8.22E-02	2.82E-01	4.94E-02	2.57E-05	6.85E-05
Remaining SOF:	0.175	I129 K&L Basin Resins	7.24E-06	8.79E-01	8.24E-06	2.83E-05	4.95E-06	4.35E-06	1.16E-05
		U233 Depleted	1.12E-01	7.00E+00	1.60E-02	5.50E-02	9.62E-03	6.73E-02	1.79E-01
		U234	2.37E-01	1.50E+01	1.58E-02	5.43E-02	9.50E-03	1.42E-01	3.80E-01
		I129 Activated Carbon	1.99E-03	1.40E-01	1.42E-02	4.89E-02	8.55E-03	1.20E-03	3.19E-03
		U238	5.75E-01	4.90E+01	1.17E-02	4.03E-02	7.05E-03	3.45E-01	9.20E-01
				SOF	2.91E-01	1.00E+00			

Table B59 Intermediate Level Vault, additional radionuclides have the same distribution as those already disposed, Target SOF Reduced to 0.700

Test Case Reduce Target SOF to 0.700 Same Distribution

Table 11 Estimated Aggregate Effects of Studies on Intermediate Level Vault, Including K&L Basin Resins

	Primary Isotopes of Concern	**IL Vault (Ci)**	**IL Vault PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Artificial Dilution**	**Adjusted ILV PA Limits (Ci)**	**Fraction of Adjusted ILV PA Limits**	**Fraction of Adjusted PA Late Well Limit**	**Fraction of PA Resident Limit**	**Fraction of PA Air Limit**	**Fraction of PA Radon Limit**
4.08E-01	C14	9.34E-01	2.7E+00			2.7E+00	0.346			0.346	
4.28E-05	I129 Generic	9.78E-05	5.2E-04	4.5E-01	4.0E-01	9.3E-05	1.057	1.057			
7.24E-06	I129 K&L Basin Resins	1.66E-05	8.8E-01	4.5E-01	4.0E-01	1.6E-01	0.00011	0.00011			
1.12E-01	U233 Depleted	2.56E-01	7.0E+00			7.0E+00	0.037		0.037		
2.37E-01	U234	5.42E-01	1.5E+01			1.5E+01	0.036				0.036
1.99E-03	I129 Activated Carbon	4.56E-03	1.4E-01	4.5E-01	4.0E-01	2.5E-02	0.183	0.183			
5.75E-01	U238	1.32E+00	4.9E+01			4.9E+01	0.027		0.027		
						Sum-of-Fractions	1.686	1.240	0.063	0.346	0.036

		Nuclide	Current Ci	Current Limit	Limit Fract	Fract SOF	Add Fract	Add Ci	New Total Ci
Current Total SOF:	0.325	C14	4.08E-01	2.70E+00	1.51E-01	5.19E-01	1.95E-01	5.26E-01	9.34E-01
Reduced Target SOF:	0.700	I129 Generic	4.28E-05	5.20E-04	8.22E-02	2.82E-01	1.06E-01	5.51E-05	9.78E-05
Remaining SOF:	0.375	I129 K&L Basin Resins	7.24E-06	8.79E-01	8.24E-06	2.83E-05	1.06E-05	9.33E-06	1.66E-05
		U233 Depleted	1.12E-01	7.00E+00	1.60E-02	5.50E-02	2.06E-02	1.44E-01	2.56E-01
		U234	2.37E-01	1.50E+01	1.58E-02	5.43E-02	2.04E-02	3.05E-01	5.42E-01
		I129 Activated Carbon	1.99E-03	1.40E-01	1.42E-02	4.89E-02	1.83E-02	2.57E-03	4.56E-03
		U238	5.75E-01	4.90E+01	1.17E-02	4.03E-02	1.51E-02	7.40E-01	1.32E+00
				SOF	2.91E-01	1.00E+00			

Table B60 Intermediate Level Vault, additional radionuclides have the same distribution as those already disposed, Target SOF Reduced to 0.600

Test Case Reduce Target SOF to 0.600 Same Distribution

Table 11 Estimated Aggregate Effects of Studies on Intermediate Level Vault, Including K&L Basin Resins

	Primary Isotopes of Concern	**IL Vault (Ci)**	**IL Vault PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Artificial Dilution**	**Adjusted ILV PA Limits (Ci)**	**Fraction of Adjusted ILV PA Limits**	**Fraction of Adjusted PA Late Well Limit**	**Fraction of PA Resident Limit**	**Fraction of PA Air Limit**	**Fraction of PA Radon Limit**
4.08E-01	C14	7.94E-01	2.7E+00			2.7E+00	0.294			0.294	
4.28E-05	I129 Generic	8.32E-05	5.2E-04	4.5E-01	4.0E-01	9.3E-05	0.898	0.898			
7.24E-06	I129 K&L Basin Resins	1.41E-05	8.8E-01	4.5E-01	4.0E-01	1.6E-01	0.00009	0.00009			
1.12E-01	U233 Depleted	2.18E-01	7.0E+00			7.0E+00	0.031		0.031		
2.37E-01	U234	4.61E-01	1.5E+01			1.5E+01	0.031				0.031
1.99E-03	I129 Activated Carbon	3.87E-03	1.4E-01	4.5E-01	4.0E-01	2.5E-02	0.155	0.155			
5.75E-01	U238	1.12E+00	4.9E+01			4.9E+01	0.023		0.023		
						Sum-of-Fractions	1.433	1.054	0.054	0.294	0.031

		Nuclide	Current Ci	Current Limit	Limit Fract	Fract SOF	Add Fract	Add Ci	New Total Ci
Current Total SOF:	0.325	C14	4.08E-01	2.70E+00	1.51E-01	5.19E-01	1.43E-01	3.85E-01	7.94E-01
Reduced Target SOF:	0.600	I129 Generic	4.28E-05	5.20E-04	8.22E-02	2.82E-01	7.77E-02	4.04E-05	8.32E-05
Remaining SOF:	0.275	I129 K&L Basin Resins	7.24E-06	8.79E-01	8.24E-06	2.83E-05	7.78E-06	6.84E-06	1.41E-05
		U233 Depleted	1.12E-01	7.00E+00	1.60E-02	5.50E-02	1.51E-02	1.06E-01	2.18E-01
		U234	2.37E-01	1.50E+01	1.58E-02	5.43E-02	1.49E-02	2.24E-01	4.61E-01
		I129 Activated Carbon	1.99E-03	1.40E-01	1.42E-02	4.89E-02	1.34E-02	1.88E-03	3.87E-03
		U238	5.75E-01	4.90E+01	1.17E-02	4.03E-02	1.11E-02	5.43E-01	1.12E+00
				SOF	2.91E-01	1.00E+00			

Table B61 Intermediate Level Vault, additional radionuclides have the same distribution as those already disposed, Target SOF Reduced to 0.550

Test Case Reduce Target SOF to 0.550 Same Distribution

Table 11 Estimated Aggregate Effects of Studies on Intermediate Level Vault, Including K&L Basin Resins

	Primary Isotopes of Concern	**IL Vault (Ci)**	**IL Vault PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Artificial Dilution**	**Adjusted ILV PA Limits (Ci)**	**Fraction of Adjusted ILV PA Limits**	**Fraction of Adjusted PA Late Well Limit**	**Fraction of PA Resident Limit**	**Fraction of PA Air Limit**	**Fraction of PA Radon Limit**
4.08E-01	C14	7.23E-01	2.7E+00			2.7E+00	0.268			0.268	
4.28E-05	I129 Generic	7.58E-05	5.2E-04	4.5E-01	4.0E-01	9.3E-05	0.819	0.819			
7.24E-06	I129 K&L Basin Resins	1.28E-05	8.8E-01	4.5E-01	4.0E-01	1.6E-01	0.00008	0.00008			
1.12E-01	U233 Depleted	1.99E-01	7.0E+00			7.0E+00	0.028		0.028		
2.37E-01	U234	4.20E-01	1.5E+01			1.5E+01	0.028				0.028
1.99E-03	I129 Activated Carbon	3.53E-03	1.4E-01	4.5E-01	4.0E-01	2.5E-02	0.142	0.142			
5.75E-01	U238	1.02E+00	4.9E+01			4.9E+01	0.021		0.021		
						Sum-of-Fractions	1.306	0.961	0.049	0.268	0.028

		Nuclide	Current Ci	Current Limit	Limit Fract	Fract SOF	Add Fract	Add Ci	New Total Ci
Current Total SOF:	0.325	C14	4.08E-01	2.70E+00	1.51E-01	5.19E-01	1.17E-01	3.15E-01	7.23E-01
Reduced Target SOF:	0.550	I129 Generic	4.28E-05	5.20E-04	8.22E-02	2.82E-01	6.36E-02	3.30E-05	7.58E-05
Remaining SOF:	0.225	I129 K&L Basin Resins	7.24E-06	8.79E-01	8.24E-06	2.83E-05	6.37E-06	5.60E-06	1.28E-05
		U233 Depleted	1.12E-01	7.00E+00	1.60E-02	5.50E-02	1.24E-02	8.66E-02	1.99E-01
		U234	2.37E-01	1.50E+01	1.58E-02	5.43E-02	1.22E-02	1.83E-01	4.20E-01
		I129 Activated Carbon	1.99E-03	1.40E-01	1.42E-02	4.89E-02	1.10E-02	1.54E-03	3.53E-03
		U238	5.75E-01	4.90E+01	1.17E-02	4.03E-02	9.07E-03	4.44E-01	1.02E+00
				SOF	2.91E-01	1.00E+00			

Table B62 Intermediate Level Vault, additional radionuclides have the same distribution as those already disposed, Target SOF Reduced to 0.540

Test Case Reduce Target SOF to 0.540 Same Distribution

Table 11 Estimated Aggregate Effects of Studies on Intermediate Level Vault, Including K&L Basin Resins

	Primary Isotopes of Concern	IL Vault (Ci)	IL Vault PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Artificial Dilution	Adjusted ILV PA Limits (Ci)	Fraction of Adjusted ILV PA Limits	Fraction of Adjusted PA Late Well Limit	Fraction of PA Resident Limit	Fraction of PA Air Limit	Fraction of PA Radon Limit
4.08E-01	C14	7.09E-01	2.7E+00			2.7E+00	0.263			0.263	
4.28E-05	I129 Generic	7.43E-05	5.2E-04	4.5E-01	4.0E-01	9.3E-05	0.803	0.803			
7.24E-06	I129 K&L Basin Resins	1.26E-05	8.8E-01	4.5E-01	4.0E-01	1.6E-01	0.00008	0.00008			
1.12E-01	U233 Depleted	1.95E-01	7.0E+00			7.0E+00	0.028		0.028		
2.37E-01	U234	4.12E-01	1.5E+01			1.5E+01	0.027				0.027
1.99E-03	I129 Activated Carbon	3.46E-03	1.4E-01	4.5E-01	4.0E-01	2.5E-02	0.139	0.139			
5.75E-01	U238	9.99E-01	4.9E+01			4.9E+01	0.020		0.020		
						Sum-of-Fractions	1.281	0.942	0.048	0.263	0.027

		Nuclide	Current Ci	Current Limit	Limit Fract	Fract SOF	Add Fract	Add Ci	New Total Ci
Current Total SOF:	0.325	C14	4.08E-01	2.70E+00	1.51E-01	5.19E-01	1.12E-01	3.01E-01	7.09E-01
Reduced Target SOF:	0.540	I129 Generic	4.28E-05	5.20E-04	8.22E-02	2.82E-01	6.07E-02	3.16E-05	7.43E-05
Remaining SOF:	0.215	I129 K&L Basin Resins	7.24E-06	8.79E-01	8.24E-06	2.83E-05	6.08E-06	5.35E-06	1.26E-05
		U233 Depleted	1.12E-01	7.00E+00	1.60E-02	5.50E-02	1.18E-02	8.27E-02	1.95E-01
		U234	2.37E-01	1.50E+01	1.58E-02	5.43E-02	1.17E-02	1.75E-01	4.12E-01
		I129 Activated Carbon	1.99E-03	1.40E-01	1.42E-02	4.89E-02	1.05E-02	1.47E-03	3.46E-03
		U238	5.75E-01	4.90E+01	1.17E-02	4.03E-02	8.66E-03	4.24E-01	9.99E-01
				SOF	2.91E-01	1.00E+00			

Table B63 Intermediate Level Vault, additional radionuclides have the same distribution as those already disposed, Target SOF Reduced to 0.545

Test Case Reduce Target SOF to 0.545 Same Distribution

Table 11 Estimated Aggregate Effects of Studies on Intermediate Level Vault, Including K&L Basin Resins

	Primary Isotopes of Concern	**IL Vault (Ci)**	**IL Vault PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Artificial Dilution**	**Adjusted ILV PA Limits (Ci)**	**Fraction of Adjusted ILV PA Limits**	**Fraction of Adjusted PA Late Well Limit**	**Fraction of PA Resident Limit**	**Fraction of PA Air Limit**	**Fraction of PA Radon Limit**
4.08E-01	C14	7.16E-01	2.7E+00			2.7E+00	0.265			0.265	
4.28E-05	I129 Generic	7.51E-05	5.2E-04	4.5E-01	4.0E-01	9.3E-05	0.811	0.811			
7.24E-06	I129 K&L Basin Resins	1.27E-05	8.8E-01	4.5E-01	4.0E-01	1.6E-01	0.00008	0.00008			
1.12E-01	U233 Depleted	1.97E-01	7.0E+00			7.0E+00	0.028		0.028		
2.37E-01	U234	4.16E-01	1.5E+01			1.5E+01	0.028				0.028
1.99E-03	I129 Activated Carbon	3.50E-03	1.4E-01	4.5E-01	4.0E-01	2.5E-02	0.140	0.140			
5.75E-01	U238	1.01E+00	4.9E+01			4.9E+01	0.021		0.021		
						Sum-of-Fractions	1.293	0.952	0.049	0.265	0.028

		Nuclide	Current Ci	Current Limit	Limit Fract	Fract SOF	Add Fract	Add Ci	New Total Ci
Current Total SOF:	0.325	C14	4.08E-01	2.70E+00	1.51E-01	5.19E-01	1.14E-01	3.08E-01	7.16E-01
Reduced Target SOF:	0.545	I129 Generic	4.28E-05	5.20E-04	8.22E-02	2.82E-01	6.21E-02	3.23E-05	7.51E-05
Remaining SOF:	0.220	I129 K&L Basin Resins	7.24E-06	8.79E-01	8.24E-06	2.83E-05	6.22E-06	5.47E-06	1.27E-05
		U233 Depleted	1.12E-01	7.00E+00	1.60E-02	5.50E-02	1.21E-02	8.46E-02	1.97E-01
		U234	2.37E-01	1.50E+01	1.58E-02	5.43E-02	1.19E-02	1.79E-01	4.16E-01
		I129 Activated Carbon	1.99E-03	1.40E-01	1.42E-02	4.89E-02	1.08E-02	1.51E-03	3.50E-03
		U238	5.75E-01	4.90E+01	1.17E-02	4.03E-02	8.86E-03	4.34E-01	1.01E+00
				SOF	2.91E-01	1.00E+00			

Table B64 Intermediate Level Vault, additional radionuclides have the same distribution as those already disposed, Target SOF Reduced to 0.543

Test Case Reduce Target SOF to 0.543 Same Distribution

Table 11 Estimated Aggregate Effects of Studies on Intermediate Level Vault, Including K&L Basin Resins

	Primary Isotopes of Concern	**IL Vault (Ci)**	**IL Vault PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Artificial Dilution**	**Adjusted ILV PA Limits (Ci)**	**Fraction of Adjusted ILV PA Limits**	**Fraction of Adjusted PA Late Well Limit**	**Fraction of PA Resident Limit**	**Fraction of PA Air Limit**	**Fraction of PA Radon Limit**
4.08E-01	C14	7.14E-01	2.7E+00			2.7E+00	0.264			0.264	
4.28E-05	I129 Generic	7.48E-05	5.2E-04	4.5E-01	4.0E-01	9.3E-05	0.808	0.808			
7.24E-06	I129 K&L Basin Resins	1.27E-05	8.8E-01	4.5E-01	4.0E-01	1.6E-01	0.00008	0.00008			
1.12E-01	U233 Depleted	1.96E-01	7.0E+00			7.0E+00	0.028		0.028		
2.37E-01	U234	4.15E-01	1.5E+01			1.5E+01	0.028				0.028
1.99E-03	I129 Activated Carbon	3.48E-03	1.4E-01	4.5E-01	4.0E-01	2.5E-02	0.140	0.140			
5.75E-01	U238	1.01E+00	4.9E+01			4.9E+01	0.021		0.021		
						Sum-of-Fractions	1.288	0.948	0.048	0.264	0.028

		Nuclide	Current Ci	Current Limit	Limit Fract	Fract SOF	Add Fract	Add Ci	New Total Ci
Current Total SOF:	0.325	C14	4.08E-01	2.70E+00	1.51E-01	5.19E-01	1.13E-01	3.06E-01	7.14E-01
Reduced Target SOF:	0.543	I129 Generic	4.28E-05	5.20E-04	8.22E-02	2.82E-01	6.16E-02	3.20E-05	7.48E-05
Remaining SOF:	0.218	I129 K&L Basin Resins	7.24E-06	8.79E-01	8.24E-06	2.83E-05	6.17E-06	5.42E-06	1.27E-05
		U233 Depleted	1.12E-01	7.00E+00	1.60E-02	5.50E-02	1.20E-02	8.39E-02	1.96E-01
		U234	2.37E-01	1.50E+01	1.58E-02	5.43E-02	1.18E-02	1.78E-01	4.15E-01
		I129 Activated Carbon	1.99E-03	1.40E-01	1.42E-02	4.89E-02	1.07E-02	1.49E-03	3.48E-03
		U238	5.75E-01	4.90E+01	1.17E-02	4.03E-02	8.78E-03	4.30E-01	1.01E+00
				SOF	2.91E-01	1.00E+00			

Table B65 Intermediate Level Vault, additional radionuclides have the same distribution as those already disposed, Target SOF Reduced to 0.544

Test Case Reduce Target SOF to 0.544 Same Distribution

Table 11 Estimated Aggregate Effects of Studies on Intermediate Level Vault, Including K&L Basin Resins

	Primary Isotopes of Concern	**IL Vault (Ci)**	**IL Vault PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Artificial Dilution**	**Adjusted ILV PA Limits (Ci)**	**Fraction of Adjusted ILV PA Limits**	**Fraction of Adjusted PA Late Well Limit**	**Fraction of PA Resident Limit**	**Fraction of PA Air Limit**	**Fraction of PA Radon Limit**
4.08E-01	C14	7.15E-01	2.7E+00			2.7E+00	0.265			0.265	
4.28E-05	I129 Generic	7.49E-05	5.2E-04	4.5E-01	4.0E-01	9.3E-05	0.810	0.810			
7.24E-06	I129 K&L Basin Resins	1.27E-05	8.8E-01	4.5E-01	4.0E-01	1.6E-01	0.00008	0.00008			
1.12E-01	U233 Depleted	1.96E-01	7.0E+00			7.0E+00	0.028		0.028		
2.37E-01	U234	4.15E-01	1.5E+01			1.5E+01	0.028				0.028
1.99E-03	I129 Activated Carbon	3.49E-03	1.4E-01	4.5E-01	4.0E-01	2.5E-02	0.140	0.140			
5.75E-01	U238	1.01E+00	4.9E+01			4.9E+01	0.021		0.021		
						Sum-of-Fractions	1.291	0.950	0.049	0.265	0.028

		Nuclide	Current Ci	Current Limit	Limit Fract	Fract SOF	Add Fract	Add Ci	New Total Ci
Current Total SOF:	0.325	C14	4.08E-01	2.70E+00	1.51E-01	5.19E-01	1.14E-01	3.07E-01	7.15E-01
Reduced Target SOF:	0.544	I129 Generic	4.28E-05	5.20E-04	8.22E-02	2.82E-01	6.19E-02	3.22E-05	7.49E-05
Remaining SOF:	0.219	I129 K&L Basin Resins	7.24E-06	8.79E-01	8.24E-06	2.83E-05	6.20E-06	5.45E-06	1.27E-05
		U233 Depleted	1.12E-01	7.00E+00	1.60E-02	5.50E-02	1.20E-02	8.42E-02	1.96E-01
		U234	2.37E-01	1.50E+01	1.58E-02	5.43E-02	1.19E-02	1.78E-01	4.15E-01
		I129 Activated Carbon	1.99E-03	1.40E-01	1.42E-02	4.89E-02	1.07E-02	1.50E-03	3.49E-03
		U238	5.75E-01	4.90E+01	1.17E-02	4.03E-02	8.82E-03	4.32E-01	1.01E+00
				SOF	2.91E-01	1.00E+00			

Table B66 Intermediate Level Vault, additional radionuclides are only generic I-129, Target SOF Reduced to 0.500

Test Case Target SOF = 0.500 Add Only I-129

Table 11 Estimated Aggregate Effects of Studies on Intermediate Level Vault, Including K&L Basin Resins

	Primary Isotopes of Concern	IL Vault (Ci)	IL Vault PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Artificial Dilution	Adjusted ILV PA Limits (Ci)	Fraction of Adjusted ILV PA Limits	Fraction of Adjusted PA Late Well Limit	Fraction of PA Resident Limit	Fraction of PA Air Limit	Fraction of PA Radon Limit
4.08E-01	C14	4.08E-01	2.7E+00			2.7E+00	0.151			0.151	
4.28E-05	I129 Generic	1.34E-04	5.2E-04	4.5E-01	4.0E-01	9.3E-05	1.445	1.445			
7.24E-06	I129 K&L Basin Resins	7.24E-06	8.8E-01	4.5E-01	4.0E-01	1.6E-01	0.00005	0.00005			
1.12E-01	U233 Depleted	1.12E-01	7.0E+00			7.0E+00	0.016		0.016		
2.37E-01	U234	2.37E-01	1.5E+01			1.5E+01	0.016				0.016
1.99E-03	I129 Activated Carbon	1.99E-03	1.4E-01	4.5E-01	4.0E-01	2.5E-02	0.080	0.080			
5.75E-01	U238	5.75E-01	4.9E+01			4.9E+01	0.012		0.012		
						Sum-of-Fractions	1.720	1.525	0.028	0.151	0.016

		Nuclide	Current Ci	Current Limit	Add Ci	New total Ci
Current Total SOF:	0.325	C14	4.08E-01	2.70E+00		
Reduced Target SOF:	0.500	I129 Generic	4.28E-05	5.20E-04	9.10E-05	1.34E-04
Remaining SOF:	0.175	I129 K&L Basin Resins	7.24E-06	8.79E-01		
		U233 Depleted	1.12E-01	7.00E+00		
		U234	2.37E-01	1.50E+01		
		I129 Activated Carbon	1.99E-03	1.40E-01		
		U238	5.75E-01	4.90E+01		

Table B67 Intermediate Level Vault, additional radionuclides are only generic I-129, Target SOF Reduced to 0.400

Test Case Target SOF = 0.400 Add Only I-129

Table 11 Estimated Aggregate Effects of Studies on Intermediate Level Vault, Including K&L Basin Resins

	Primary Isotopes of Concern	**IL Vault (Ci)**	**IL Vault PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Artificial Dilution**	**Adjusted ILV PA Limits (Ci)**	**Fraction of Adjusted ILV PA Limits**	**Fraction of Adjusted PA Late Well Limit**	**Fraction of PA Resident Limit**	**Fraction of PA Air Limit**	**Fraction of PA Radon Limit**
4.08E-01	C14	4.08E-01	2.7E+00			2.7E+00	0.151			0.151	
4.28E-05	I129 Generic	8.18E-05	5.2E-04	4.5E-01	4.0E-01	9.3E-05	0.883	0.883			
7.24E-06	I129 K&L Basin Resins	7.24E-06	8.8E-01	4.5E-01	4.0E-01	1.6E-01	0.00005	0.00005			
1.12E-01	U233 Depleted	1.12E-01	7.0E+00			7.0E+00	0.016		0.016		
2.37E-01	U234	2.37E-01	1.5E+01			1.5E+01	0.016				0.016
1.99E-03	I129 Activated Carbon	1.99E-03	1.4E-01	4.5E-01	4.0E-01	2.5E-02	0.080	0.080			
5.75E-01	U238	5.75E-01	4.9E+01			4.9E+01	0.012		0.012		
						Sum-of-Fractions	1.158	0.963	0.028	0.151	0.016

		Nuclide	Current Ci	Current Limit	Add Ci	New total Ci
Current Total SOF:	0.325	C14	4.08E-01	2.70E+00		
Reduced Target SOF:	0.400	I129 Generic	4.28E-05	5.20E-04	3.90E-05	8.18E-05
Remaining SOF:	0.075	I129 K&L Basin Resins	7.24E-06	8.79E-01		
		U233 Depleted	1.12E-01	7.00E+00		
		U234	2.37E-01	1.50E+01		
		I129 Activated Carbon	1.99E-03	1.40E-01		
		U238	5.75E-01	4.90E+01		

Table B68 Intermediate Level Vault, additional radionuclides are only generic I-129, Target SOF Reduced to 0.350

Test Case Target SOF = 0.350 Add Only I-129

Table 11 Estimated Aggregate Effects of Studies on Intermediate Level Vault, Including K&L Basin Resins

	Primary Isotopes of Concern	IL Vault (Ci)	IL Vault PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Artificial Dilution	Adjusted ILV PA Limits (Ci)	Fraction of Adjusted ILV PA Limits	Fraction of Adjusted PA Late Well Limit	Fraction of PA Resident Limit	Fraction of PA Air Limit	Fraction of PA Radon Limit
4.08E-01	C14	4.08E-01	2.7E+00			2.7E+00	0.151			0.151	
4.28E-05	I129 Generic	5.58E-05	5.2E-04	4.5E-01	4.0E-01	9.3E-05	0.603	0.603			
7.24E-06	I129 K&L Basin Resins	7.24E-06	8.8E-01	4.5E-01	4.0E-01	1.6E-01	0.00005	0.00005			
1.12E-01	U233 Depleted	1.12E-01	7.0E+00			7.0E+00	0.016		0.016		
2.37E-01	U234	2.37E-01	1.5E+01			1.5E+01	0.016				0.016
1.99E-03	I129 Activated Carbon	1.99E-03	1.4E-01	4.5E-01	4.0E-01	2.5E-02	0.080	0.080			
5.75E-01	U238	5.75E-01	4.9E+01			4.9E+01	0.012		0.012		
						Sum-of-Fractions	0.877	0.682	0.028	0.151	0.016

		Nuclide	Current Ci	Current Limit	Add Ci	New total Ci
Current Total SOF:	0.325	C14	4.08E-01	2.70E+00		
Reduced Target SOF:	0.350	I129 Generic	4.28E-05	5.20E-04	1.30E-05	5.58E-05
Remaining SOF:	0.025	I129 K&L Basin Resins	7.24E-06	8.79E-01		
		U233 Depleted	1.12E-01	7.00E+00		
		U234	2.37E-01	1.50E+01		
		I129 Activated Carbon	1.99E-03	1.40E-01		
		U238	5.75E-01	4.90E+01		

Table B69 Intermediate Level Vault, additional radionuclides are only generic I-129, Target SOF Reduced to 0.390

Test Case Target SOF = 0.390 Add Only I-129

Table 11 Estimated Aggregate Effects of Studies on Intermediate Level Vault, Including K&L Basin Resins

	Primary Isotopes of Concern	**IL Vault (Ci)**	**IL Vault PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Artificial Dilution**	**Adjusted ILV PA Limits (Ci)**	**Fraction of Adjusted ILV PA Limits**	**Fraction of Adjusted PA Late Well Limit**	**Fraction of PA Resident Limit**	**Fraction of PA Air Limit**	**Fraction of PA Radon Limit**
4.08E-01	C14	4.08E-01	2.7E+00			2.7E+00	0.151			0.151	
4.28E-05	I129 Generic	7.66E-05	5.2E-04	4.5E-01	4.0E-01	9.3E-05	0.827	0.827			
7.24E-06	I129 K&L Basin Resins	7.24E-06	8.8E-01	4.5E-01	4.0E-01	1.6E-01	0.00005	0.00005			
1.12E-01	U233 Depleted	1.12E-01	7.0E+00			7.0E+00	0.016		0.016		
2.37E-01	U234	2.37E-01	1.5E+01			1.5E+01	0.016				0.016
1.99E-03	I129 Activated Carbon	1.99E-03	1.4E-01	4.5E-01	4.0E-01	2.5E-02	0.080	0.080			
5.75E-01	U238	5.75E-01	4.9E+01			4.9E+01	0.012		0.012		
						Sum-of-Fractions	1.102	0.907	0.028	0.151	0.016

		Nuclide	Current Ci	Current Limit	Add Ci	New total Ci
Current Total SOF:	0.325	C14	4.08E-01	2.70E+00		
Reduced Target SOF:	0.390	I129 Generic	4.28E-05	5.20E-04	3.38E-05	7.66E-05
Remaining SOF:	0.065	I129 K&L Basin Resins	7.24E-06	8.79E-01		
		U233 Depleted	1.12E-01	7.00E+00		
		U234	2.37E-01	1.50E+01		
		I129 Activated Carbon	1.99E-03	1.40E-01		
		U238	5.75E-01	4.90E+01		

Table B70 Intermediate Level Vault, additional radionuclides are only generic I-129, Target SOF Reduced to 0.395

Test Case Target SOF = 0.395 Add Only I-129

Table 11 Estimated Aggregate Effects of Studies on Intermediate Level Vault, Including K&L Basin Resins

	Primary Isotopes of Concern	IL Vault (Ci)	IL Vault PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Artificial Dilution	Adjusted ILV PA Limits (Ci)	Fraction of Adjusted ILV PA Limits	Fraction of Adjusted PA Late Well Limit	Fraction of PA Resident Limit	Fraction of PA Air Limit	Fraction of PA Radon Limit
4.08E-01	C14	4.08E-01	2.7E+00			2.7E+00	0.151			0.151	
4.28E-05	I129 Generic	7.92E-05	5.2E-04	4.5E-01	4.0E-01	9.3E-05	0.855	0.855			
7.24E-06	I129 K&L Basin Resins	7.24E-06	8.8E-01	4.5E-01	4.0E-01	1.6E-01	0.00005	0.00005			
1.12E-01	U233 Depleted	1.12E-01	7.0E+00			7.0E+00	0.016		0.016		
2.37E-01	U234	2.37E-01	1.5E+01			1.5E+01	0.016				0.016
1.99E-03	I129 Activated Carbon	1.99E-03	1.4E-01	4.5E-01	4.0E-01	2.5E-02	0.080	0.080			
5.75E-01	U238	5.75E-01	4.9E+01			4.9E+01	0.012		0.012		
						Sum-of-Fractions	1.130	0.935	0.028	0.151	0.016

		Nuclide	Current Ci	Current Limit	Add Ci	New total Ci
Current Total SOF:	0.325	C14	4.08E-01	2.70E+00		
Reduced Target SOF:	0.395	I129 Generic	4.28E-05	5.20E-04	3.64E-05	7.92E-05
Remaining SOF:	0.070	I129 K&L Basin Resins	7.24E-06	8.79E-01		
		U233 Depleted	1.12E-01	7.00E+00		
		U234	2.37E-01	1.50E+01		
		I129 Activated Carbon	1.99E-03	1.40E-01		
		U238	5.75E-01	4.90E+01		

Table B71 Intermediate Level Vault, additional radionuclides are only generic I-129, Target SOF Reduced to 0.397

Test Case Target SOF = 0.397 Add Only I-129

Table 11 Estimated Aggregate Effects of Studies on Intermediate Level Vault, Including K&L Basin Resins

	Primary Isotopes of Concern	**IL Vault (Ci)**	**IL Vault PA Limit (Ci)**	**Limit Adjustment Aquifer Source Node**	**Limit Adjustment Artificial Dilution**	**Adjusted ILV PA Limits (Ci)**	**Fraction of Adjusted ILV PA Limits**	**Fraction of Adjusted PA Late Well Limit**	**Fraction of PA Resident Limit**	**Fraction of PA Air Limit**	**Fraction of PA Radon Limit**
4.08E-01	C14	4.08E-01	2.7E+00			2.7E+00	0.151			0.151	
4.28E-05	I129 Generic	8.02E-05	5.2E-04	4.5E-01	4.0E-01	9.3E-05	0.867	0.867			
7.24E-06	I129 K&L Basin Resins	7.24E-06	8.8E-01	4.5E-01	4.0E-01	1.6E-01	0.00005	0.00005			
1.12E-01	U233 Depleted	1.12E-01	7.0E+00			7.0E+00	0.016		0.016		
2.37E-01	U234	2.37E-01	1.5E+01			1.5E+01	0.016				0.016
1.99E-03	I129 Activated Carbon	1.99E-03	1.4E-01	4.5E-01	4.0E-01	2.5E-02	0.080	0.080			
5.75E-01	U238	5.75E-01	4.9E+01			4.9E+01	0.012		0.012		
						Sum-of-Fractions	1.141	0.947	0.028	0.151	0.016

		Nuclide	Current Ci	Current Limit	Add Ci	New total Ci
Current Total SOF:	0.325	C14	4.08E-01	2.70E+00		
Reduced Target SOF:	0.397	I129 Generic	4.28E-05	5.20E-04	3.74E-05	8.02E-05
Remaining SOF:	0.072	I129 K&L Basin Resins	7.24E-06	8.79E-01		
		U233 Depleted	1.12E-01	7.00E+00		
		U234	2.37E-01	1.50E+01		
		I129 Activated Carbon	1.99E-03	1.40E-01		
		U238	5.75E-01	4.90E+01		

Table B72 Intermediate Level Vault, additional radionuclides are only generic I-129, Target SOF Reduced to 0.398

Test Case Target SOF = 0.398 Add Only I-129

Table 11 Estimated Aggregate Effects of Studies on Intermediate Level Vault, Including K&L Basin Resins

	Primary Isotopes of Concern	IL Vault (Ci)	IL Vault PA Limit (Ci)	Limit Adjustment Aquifer Source Node	Limit Adjustment Artificial Dilution	Adjusted ILV PA Limits (Ci)	Fraction of Adjusted ILV PA Limits	Fraction of Adjusted PA Late Well Limit	Fraction of PA Resident Limit	Fraction of PA Air Limit	Fraction of PA Radon Limit
4.08E-01	C14	4.08E-01	2.7E+00			2.7E+00	0.151			0.151	
4.28E-05	I129 Generic	8.07E-05	5.2E-04	4.5E-01	4.0E-01	9.3E-05	0.872	0.872			
7.24E-06	I129 K&L Basin Resins	7.24E-06	8.8E-01	4.5E-01	4.0E-01	1.6E-01	0.00005	0.00005			
1.12E-01	U233 Depleted	1.12E-01	7.0E+00			7.0E+00	0.016		0.016		
2.37E-01	U234	2.37E-01	1.5E+01			1.5E+01	0.016				0.016
1.99E-03	I129 Activated Carbon	1.99E-03	1.4E-01	4.5E-01	4.0E-01	2.5E-02	0.080	0.080			
5.75E-01	U238	5.75E-01	4.9E+01			4.9E+01	0.012		0.012		
						Sum-of-Fractions	1.147	0.952	0.028	0.151	0.016

		Nuclide	Current Ci	Current Limit	Add Ci	New total Ci
Current Total SOF:	0.325	C14	4.08E-01	2.70E+00		
Reduced Target SOF:	0.398	I129 Generic	4.28E-05	5.20E-04	3.80E-05	8.07E-05
Remaining SOF:	0.073	I129 K&L Basin Resins	7.24E-06	8.79E-01		
		U233 Depleted	1.12E-01	7.00E+00		
		U234	2.37E-01	1.50E+01		
		I129 Activated Carbon	1.99E-03	1.40E-01		
		U238	5.75E-01	4.90E+01		

Table B73 Naval Reactor Pad, no additional radionuclides

Test Case Base Case

Table 12 Estimated Aggregate Effects of Studies on NR Pad

	Primary Isotopes of Concern	NR Disposal Pad (Ci)	NR Disposal Pad PA Limit (Ci)	Fraction of PA Limit
6.68E+01	C14	6.68E+01	7.7E+02	0.087
			Sum-of-Fraction	**0.087**

		Nuclide	Current Ci	Current Limit
Current Total SOF:	9.32E-02	C14	6.68E+01	7.70E+02
Current Target SOF:	1.00E+00			
Remaining SOF:	9.07E-01			

Table B74 Naval Reactor Pad, additional radionuclides are only C-14

Test Case Add Only C-14

Table 12 Estimated Aggregate Effects of Studies on NR Pad

	Primary Isotopes of Concern	NR Disposal Pad (Ci)	NR Disposal Pad PA Limit (Ci)	Fraction of PA Limit
6.68E+01	C14	7.65E+02	7.7E+02	0.994
			Sum-of-Fraction	**0.994**

		Nuclide	Current Ci	Current Limit	Add Ci	New Total Ci
Current Total SOF:	9.32E-02	C14	6.68E+01	7.70E+02	6.98E+02	7.65E+02
Current Target SOF:	1.00E+00					
Remaining SOF:	9.07E-01					

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ATTACHMENTS

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Don Sink

To: Elmer Wilhite/WSRC/Srs@Srs
cc:
Subject: Slit Trench 1 PA Status - Impacts From 232-F Rubble

05/06/2003 11:52 AM

Data on Tritium from 232-F D&D Waste.

----- Forwarded by Don Sink/BSRI/Srs on 05/06/03 11:50 AM -----

Don Sink

09/20/01 08:24 AM

To: Jim Cook/WSRC/Srs@srs
cc: Keith Stone/BSRI/Srs@Srs, Elmer Wilhite/WSRC/Srs@Srs, Luke Reid/WSRC/Srs@Srs, Shawn Reed/WSRC/Srs@Srs, Welford03 Goldston/WSRC/Srs@Srs, William Knopf/WSRC/Srs@Srs
Subject: Slit Trench 1 PA Status - Impacts From 232-F Rubble

I understand you are developing an UDQ-E for the smaller footprint of the first set of slit trenches. I thought this information may be helpful for your review. As of today, the first set of slit trenches has a PA sum-of-fraction of 0.716. I had Bill Knopf run a WITS report to determine the actual contribution of the 232-F Rubble in the slit trenches since it was a heavy burden to the PA inventory. This rubble contributed a sum-of-fraction value of 0.614 with waste volume of approximately 3,444 m3. The remaining waste in the trenches offers only a sum-of-fraction value of only 0.102. The rubble as a total activity amount of 3.8965 Ci. The rubble's waste stream has a distribution of:

H-3	99.28%
Cs-137	0.52%
Co-60	0.14%
Am-241	0.01%
Other Beta	0.05%

I hope this information will be helpful with your review. The slit trenches are protected in WITS with a PA sum-of-fraction limit of 0.9 . I still plan to add several of the high I-129 waste boxes (excluding the resins and the high PAM values) to this first set of trenches prior to closure.

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Elmer Wilhite

05/09/2003 04:13 PM

To: Laura Bagwell/BSRI/Srs@Srs, Mary Flora/WSRC/Srs@Srs, Michele Wilson/WSRC/Srs@Srs, Jim Cook/WSRC/Srs@srs, Tom Butcher/WSRC/Srs@Srs

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Subject: Summary of Meeting on CERCLA Perspective on PA Point of Compliance and Institutional Controls

Discussions were held on May 6, and May 9, 2003, with Michele Wilson, Laura Bagwell, Mary Flora, Tom Butcher, Jim Cook and I to consider the CERCLA perspective on the point of compliance and effect of institutional controls that should be used in performance assessments (PA) of DOE LLW disposal facilities (i.e., Saltstone and E-Area Low Level Waste Facility (ELLWF)).

As part of the revision of the saltstone PA, we are considering whether we have been too conservative in assumptions regarding the point of compliance and institutional controls. Perspectives that are being considered include the following:

> We have assumed that the point of compliance is the point of maximum groundwater concentration outside a 100-meter buffer zone surrounding the waste. DOE 435.1, however, permits a larger buffer zone, with justification. Based on the SRS land-use plan, none of the current SRS property will ever be released for unrestricted use. Also, the land-use plan zones the General Separations Area (GSA) as being restricted to industrial uses. Therefore, from the DOE 435.1 perspective, the proper point of compliance would be at the edge of the GSA.

> Another consideration relative to the groundwater pathway is the subsurface zone where groundwater concentrations are assessed. The uppermost portion of the saturated zone will generally not yield enough water for household use, so, to assess the all-pathways dose, the portion of the aquifer should be selected based on the ability of the zone to yield sufficient water for household use. For groundwater protection, however, the selection of the subsurface zone may not depend on the yield of the aquifer.

> Another consideration is whether institutional controls should impact assessment of groundwater protection. In other words, is it necessary to ensure the protection of the groundwater during a period when institutional controls would prevent use of the water?

These perspectives were shared with Michele, Laura, and Mary. Their thoughts were that although CERCLA is not very specific with respect to such things as the point of compliance (CERCLA has discussed institutional controls in guidance, but it relates to remediated waste sites), our past dealings with the regulators (i.e., SCDHEC and EPA) have established precedents. For example, SCDHEC has stated that the groundwater beneath the facility must be protected to drinking water standards because all groundwater in the state must meet drinking water standards. However, the regulators have let us comply with drinking water standards at the boundary of the facility (i.e., about one hundred feet from the waste).

Although the regulators have allowed us to use a type of "mixing zone" to define a compliance point further from the waste (i.e., at the seep line of the nearest creek to the HLW tank farms for tank closure), that flexibility was granted because the regulators didn't believe we could meet the standards at 100 feet from the tanks (based on the assumptions made for modeling future releases) and yet they wanted the tanks closed. Therefore, an argument for the use of the seep line for saltstone or the ELLWF would likely not be acceptable to the regulators. On the other hand, the EPA/SCDHEC did not allow ER to utilize the seep line when evaluating releases to the groundwater under the RCRA/CERCLA program, even though some areas of contamination (e.g., spills, leaks) are within the boundaries of the tank farm.

With respect to the aquifer zone that should be assessed versus drinking water standards, the regulators expect that monitoring wells will be placed to intercept the highest concentrations without regard to the ability of the zone to yield enough water for household consumption.

With respect to the protection of groundwater only during times that the groundwater could be accessed (i.e., after the period of active institutional control), EPA/CERCLA would consider any evidence of groundwater contamination above an MCL at an operating facility to trigger listing the facility in the FFA and to make it subject to the remedial process.

Michelle said that the regulators have indicated that because of the pre-existing tritium groundwater contamination beneath the ELLWF they cannot determine whether the contamination is from the MWMF, LLRDF or ELLWF. Therefore, they could default to the conservative position that it is originating from the new facility operation. They simply have chosen not to pursue this line of reasoning and issue us an NOD at this time.

Michele also made the point that, if we decided to ignore the regulator's perspective in operating ELLWF or saltstone and the regulators became aware of groundwater contamination above the drinking water standards at 100 feet from the facility where the saltstone permit would require we monitor per recent regulatory discussions, they could declare that the facility had an unpermitted release and shut it down and require remediation.

Mary indicated that we have approval from EPA to dispose of CERCLA waste in the ELLWF (CERCLA off-site rule). If we modified the PA to take advantage of a different point of compliance, we would have to notify EPA and they may not grant off-site rule approval. This would jeopardize SRS' ability to dispose of D&D or CERCLA waste in E-Area.

Mary and Laura suggested, and Michele agreed, that we should approach the regulators with the arguments for changes in the point of assessment or definition of an alternate concentration limit instead of the MCL. The basis for such a change is that the groundwater within the GSA will never be accessible to the public and, if it were, the shallow groundwater aquifer cannot yield enough water to be useable. However, it's important to consider other activities we have going on with the regulators, so we can prioritize what is most critical to approach them with and also give them an idea of how best to prioritize their SRS resources.

My conclusion from the discussion is that, with respect to the 25 mrem/year all-pathways analysis in the PA, we can apply a number of considerations with respect to point of compliance based on land use (i.e., seep line), selection of aquifer zone based on water yield, and use of institutional controls to deny access to the water. However, for the protection of water resources, it would be too risky to take advantage of any of those considerations without having gotten buy-in from the regulators.

I hope this summary is helpful. If you have questions, please call

Elmer
5-5800

Westinghouse
Savannah River Company
Aiken, SC 29808

OBU-SWE-2003-00058

To: Tom Butcher, 773-43A

From: Don Sink, 724-15E

Subject: E Area Vault Facilities Performance Assessment and Volumetric Status as of 4/16/03

Please find attached a review of each E Area Vault Facility for Performance Assessment Sum-of-Fraction and Volumetric Status. This data should be used in conjunction with the Interim Measures Assessment.

Please call me at 2-4846 if you have any questions on this subject.

CC: Luke Reid, 705-3C
Welford Goldston, 705-3C
Shawn Reed, 724-15E
Kevin Tempel, 724-15E
Keith Stone, 724-7E
Jim Cook,773-43A
Elmire Wilhite, 773-43A
Len Collard, 773-43A
Greg Flach, 773-42A
SWE Files, 705-3C

Determine the Sum-of-Fraction of LAW Vault and all contributing isotopes

ISOTOPE	LAW Vault Activity (Ci)	LAW Vault PA Limit (Ci)	Fraction Of PA Limit
Other Alpha	7.58E-02	No Limit	0.00E+00
AC228	3.88E-03	No Limit	0.00E+00
AM241	8.98E-01	2.1E+04	4.28E-05
AM242M	1.43E-02	No Limit	0.00E+00
AM243	1.77E-03	2.4E+00	7.38E-04
Other Beta Gamma	1.85E+00	No Limit	0.00E+00
BA133	6.55E-02	No Limit	0.00E+00
BA137M	2.82E+01	No Limit	0.00E+00
BI207	7.82E-06	No Limit	0.00E+00
BI210	6.93E-05	No Limit	0.00E+00
BI212	1.06E-02	No Limit	0.00E+00
BI214	8.85E-05	No Limit	0.00E+00
C14	1.54E-01	2.7E+00	5.72E-02
CD109	2.51E-05	No Limit	0.00E+00
CE139	4.23E-07	No Limit	0.00E+00
CE144	8.68E-01	No Limit	0.00E+00
CF249	3.95E-05	8.5E+02	4.65E-08
CF250	9.65E-04	1.2E+05	8.04E-09
CF251	1.21E-04	1.8E+03	6.71E-08
CF252	5.93E-03	5.9E+06	1.01E-09
CL36	7.96E-04	No Limit	0.00E+00
CM242	2.74E-05	No Limit	0.00E+00
CM243	1.30E-05	No Limit	0.00E+00
CM244	1.24E+00	9.4E+04	1.32E-05
CM245	2.28E-03	3.7E+01	6.18E-05
CM246	4.06E-03	3.2E+02	1.27E-05
CM247	9.11E-13	1.7E+00	5.36E-13
CM248	1.43E-11	4.4E+01	3.24E-13
CO57	4.66E+00	No Limit	0.00E+00
CO58	5.70E-01	No Limit	0.00E+00
CO60	3.90E+00	3.5E+07	1.11E-07
CR51	2.77E-03	No Limit	0.00E+00
CS134	1.95E+00	No Limit	0.00E+00
CS135	1.47E-07	3.5E+00	4.20E-08
CS137	4.09E+01	9.0E+03	4.55E-03
EU152	2.53E+00	3.7E+04	6.85E-05
EU154	1.92E+00	5.0E+05	3.83E-06
EU155	2.33E-03	No Limit	0.00E+00
FE55	8.05E+00	No Limit	0.00E+00
FE59	1.43E-02	No Limit	0.00E+00
H3	1.99E+05	6.4E+07	3.11E-03
HF181	3.85E-03	No Limit	0.00E+00
HG203	1.38E-05	No Limit	0.00E+00
I129 Generic	1.62E-04	1.2E-03	1.35E-01
I129 GT-73 Resin	7.43E-07	1.1E-01	6.76E-06
IN113M	6.82E-06	No Limit	0.00E+00
K40	9.40E-06	No Limit	0.00E+00

KR85	1.51E+00	No Limit	0.00E+00
MN54	9.46E-02	No Limit	0.00E+00
NA22	5.18E-07	No Limit	0.00E+00
NB93M	8.81E-03	No Limit	0.00E+00
NB94	5.46E-04	2.2E+00	2.48E-04
NB95	2.54E-02	No Limit	0.00E+00
NB95M	7.32E-06	No Limit	0.00E+00
NI59	7.86E-02	6.0E+04	1.31E-06
NI63	3.46E+00	2.7E+14	1.28E-14
NP237	2.54E-02	4.2E+00	6.04E-03
NP239	1.60E-08	No Limit	0.00E+00
PA233	2.68E-05	No Limit	0.00E+00
PA234	1.96E-03	No Limit	0.00E+00
PA234M	1.10E+00	No Limit	0.00E+00
PB210	6.93E-05	No Limit	0.00E+00
PB212	1.06E-02	No Limit	0.00E+00
PB214	8.63E-05	No Limit	0.00E+00
PD107	1.08E-13	2.5E+01	4.32E-15
PM147	7.91E+00	No Limit	0.00E+00
PO210	6.93E-05	No Limit	0.00E+00
PO212	1.73E-03	No Limit	0.00E+00
PO214	7.82E-05	No Limit	0.00E+00
PO216	1.06E-02	No Limit	0.00E+00
PO218	7.82E-05	No Limit	0.00E+00
PR144	7.85E-01	No Limit	0.00E+00
PR144M	1.09E-03	No Limit	0.00E+00
PU238	4.60E+00	1.5E+06	3.07E-06
PU239	1.95E+00	1.8E+02	1.08E-02
PU240	5.92E-01	2.6E+02	2.28E-03
PU241	1.96E+01	6.3E+05	3.11E-05
PU242	7.96E-03	1.6E+02	4.97E-05
PU244	6.91E-16	1.2E+01	5.75E-17
RA224	9.12E-03	No Limit	0.00E+00
RA226	8.09E-05	No Limit	0.00E+00
RA228	4.23E-03	No Limit	0.00E+00
RB86	4.65E-05	No Limit	0.00E+00
RH103M	5.21E-06	No Limit	0.00E+00
RH106	2.46E-02	No Limit	0.00E+00
RN220	1.06E-02	No Limit	0.00E+00
RN222	7.82E-05	No Limit	0.00E+00
RU103	5.21E-06	No Limit	0.00E+00
RU106	1.24E-01	No Limit	0.00E+00
S35	2.96E-03	No Limit	0.00E+00
SB125	2.51E-01	No Limit	0.00E+00
SB126M	6.50E-06	No Limit	0.00E+00
SE79	9.73E-02	1.1E+02	8.85E-04
SM151	3.48E-04	5.6E+16	6.22E-21
SN113	7.55E-06	No Limit	0.00E+00
SN126	4.63E-04	2.4E+01	1.93E-05
SR85	2.18E-03	No Limit	0.00E+00
SR89	1.69E-07	No Limit	0.00E+00
SR90	6.07E+01	4.6E+18	1.32E-17

TA182	9.43E-06	No Limit	0.00E+00
TC99	1.00E-01	6.0E+00	1.67E-02
TE125M	1.69E-03	No Limit	0.00E+00
TH228	1.06E-02	No Limit	0.00E+00
TH230	2.53E-03	No Limit	0.00E+00
TH231	1.03E-01	No Limit	0.00E+00
TH232	2.77E-03	4.8E+00	5.78E-04
TH234	1.23E+00	No Limit	0.00E+00
TL208	9.71E-04	No Limit	0.00E+00
U232	9.57E-03	1.7E+02	5.63E-05
U233	5.05E-01	4.5E+01	1.12E-02
U233 Depleted	1.24E-02	4.5E+01	2.75E-04
U234	3.71E+00	1.2E+02	3.09E-02
U235	1.01E-01	2.6E+01	3.88E-03
U235 Depleted	2.52E-02	2.6E+01	9.70E-04
U236	7.31E-02	5.8E+02	1.26E-04
U238	1.12E+00	1.3E+02	8.60E-03
Y90	5.79E+01	No Limit	0.00E+00
ZN65	7.89E-02	No Limit	0.00E+00
ZR93	6.77E-06	3.9E+02	1.73E-08
ZR95	9.29E-03	No Limit	0.00E+00
			2.95E-01

<u>Identify the Primary Isotopes Of Concern (>1% disposed in the LAW Vault)</u>

Primary Isotopes Of Concern	LAW Vault Activity (Ci)	LAW Vault PA Limit (Ci)	Fraction Of PA Limit
I129 Generic	1.62E-04	1.2E-03	1.35E-01
C14	1.54E-01	2.7E+00	5.72E-02
U234	3.71E+00	1.2E+02	3.09E-02
TC99	1.00E-01	6.0E+00	1.67E-02
U233	5.05E-01	4.5E+01	1.12E-02
PU239	1.95E+00	1.8E+02	1.08E-02
			2.62E-01

Determine the Sum-of-Fraction of IL Vault and all contributing isotopes

ISOTOPE	IL Vault Activity (Ci)	IL Vault PA Limit (Ci)	Fraction Of PA Limit
Other Alpha	1.50E-02	No Limit	0.00E+00
AC228	1.79E-05	No Limit	0.00E+00
AG110M	3.00E-09	No Limit	0.00E+00
AM241	3.35E-01	3.0E+04	1.12E-05
AM242M	5.53E-06	2.7E+07	2.05E-13
AM243	2.89E-05	1.9E+01	1.52E-06
Other Beta Gamma	1.58E+00	No Limit	0.00E+00
BA137M	1.25E+02	No Limit	0.00E+00
BI210	6.10E-07	No Limit	0.00E+00
BI211	3.17E-07	No Limit	0.00E+00
BI212	1.28E-04	No Limit	0.00E+00
BI214	7.67E-01	No Limit	0.00E+00
C14	4.08E-01	2.7E+00	1.51E-01
CE144	3.34E-01	No Limit	0.00E+00
CF249	5.58E-07	8.9E+02	6.27E-10
CF251	1.70E-06	2.7E+04	6.31E-11
CM242	2.16E-06	No Limit	0.00E+00
CM243	7.12E-03	No Limit	0.00E+00
CM244	5.90E-01	4.6E+07	1.28E-08
CM245	4.04E-06	3.8E+01	1.06E-07
CM246	2.99E-06	2.4E+05	1.25E-11
CM247	1.70E-10	3.4E+00	4.99E-11
CM248	2.89E-15	8.1E+02	3.57E-18
CO57	5.07E-05	No Limit	0.00E+00
CO58	1.93E+00	No Limit	0.00E+00
CO60	7.39E+01	6.3E+08	1.17E-07
CR51	5.55E-16	No Limit	0.00E+00
CS134	4.66E-01	No Limit	0.00E+00
CS137	1.91E+02	6.5E+05	2.95E-04
EU152	4.14E-05	No Limit	0.00E+00
EU154	1.49E-01	1.1E+07	1.36E-08
EU155	1.12E-02	No Limit	0.00E+00
FE55	8.15E+01	No Limit	0.00E+00
FE59	2.47E-09	No Limit	0.00E+00
H3	4.93E+05	5.5E+07	8.97E-03
HF175	1.87E-05	No Limit	0.00E+00
HF181	7.33E-05	No Limit	0.00E+00
I129 Generic	5.00E-05	5.2E-04	9.62E-02
I129 Activated Carbon	1.99E-03	1.4E-01	1.42E-02
IN113M	5.01E-06	No Limit	0.00E+00
K40	7.76E-07	No Limit	0.00E+00
KR85	2.02E+01	No Limit	0.00E+00
MN54	4.01E-01	No Limit	0.00E+00
NB93M	5.72E-08	No Limit	0.00E+00
NB94	4.88E-04	No Limit	0.00E+00
NB95	4.77E-03	No Limit	0.00E+00
NB95M	1.88E-05	No Limit	0.00E+00

NI59	4.04E-02	3.0E+02	1.35E-04
NI63	1.14E+01	No Limit	0.00E+00
NP237	1.93E-03	6.0E+00	3.21E-04
PA234	1.30E-01	No Limit	0.00E+00
PA234M	1.77E-01	No Limit	0.00E+00
PB210	7.67E-01	No Limit	0.00E+00
PB212	1.28E-04	No Limit	0.00E+00
PB214	7.67E-01	No Limit	0.00E+00
PM147	2.17E+00	No Limit	0.00E+00
PO210	6.10E-07	No Limit	0.00E+00
PO212	5.26E-07	No Limit	0.00E+00
PO214	7.67E-01	No Limit	0.00E+00
PO216	1.28E-04	No Limit	0.00E+00
PO218	7.67E-01	No Limit	0.00E+00
PR144	2.71E-01	No Limit	0.00E+00
PR144M	1.88E-03	No Limit	0.00E+00
PU238	1.29E+00	2.2E+10	5.87E-11
PU239	3.53E-01	2.9E+04	1.22E-05
PU240	3.34E-02	1.3E+05	2.57E-07
PU241	1.42E+00	8.9E+05	1.60E-06
PU242	2.72E-03	5.2E+04	5.24E-08
PU244	1.16E-02	3.1E+00	3.73E-03
RA224	1.28E-04	No Limit	0.00E+00
RA226	7.67E-01	No Limit	0.00E+00
RA228	1.79E-05	No Limit	0.00E+00
RH103M	6.85E-05	No Limit	0.00E+00
RH106	2.20E-02	No Limit	0.00E+00
RN220	1.28E-04	No Limit	0.00E+00
RN222	7.67E-01	No Limit	0.00E+00
RU103	6.85E-05	No Limit	0.00E+00
RU106	8.78E-02	No Limit	0.00E+00
SB125	9.17E-02	No Limit	0.00E+00
SE79	1.01E-04	2.9E+01	3.48E-06
SN113	5.01E-06	No Limit	0.00E+00
SN126	4.85E-04	7.5E-01	6.47E-04
SR90	1.77E+01	1.8E+10	9.82E-10
TA182	3.44E-05	No Limit	0.00E+00
TC99	6.02E-02	2.5E+01	2.41E-03
TE125M	8.39E-04	No Limit	0.00E+00
TH228	1.28E-04	No Limit	0.00E+00
TH230	1.82E-05	No Limit	0.00E+00
TH231	1.87E-03	No Limit	0.00E+00
TH232	4.92E-05	4.1E-01	1.20E-04
TH234	3.07E-01	No Limit	0.00E+00
TL208	1.15E-07	No Limit	0.00E+00
U232	1.06E-04	9.4E+02	1.13E-07
U233	1.08E-02	7.0E+00	1.54E-03
U233 Depleted	1.12E-01	7.0E+00	1.60E-02
U234	2.37E-01	1.5E+01	1.58E-02
U235	2.37E-03	6.0E+00	3.96E-04
U235 Depleted	6.10E-03	6.0E+00	1.02E-03
U236	1.67E-03	3.1E+04	5.40E-08

U238	5.75E-01	4.9E+01	1.17E-02
Y90	1.30E+01	No Limit	0.00E+00
ZN65	3.49E-01	No Limit	0.00E+00
ZR93	6.11E-06	9.8E+05	6.23E-12
ZR95	2.22E-03	No Limit	0.00E+00
		Sum-of-Fraction	**3.25E-01**

Identify the Primary Isotopes Of Concern (>1% disposed in the IL Vault)

Primary Isotopes Of Concern	IL Vault Activity (Ci)	IL Vault PA Limit (Ci)	Fraction Of PA Limit
C14	4.08E-01	2.7E+00	1.51E-01
I129 Generic	5.00E-05	5.2E-04	9.62E-02
U233 Depleted	1.12E-01	7.0E+00	1.60E-02
U234	2.37E-01	1.5E+01	1.58E-02
I129 Activated Carbon	1.99E-03	1.4E-01	1.42E-02
U238	5.75E-01	4.9E+01	1.17E-02
			3.05E-01

Determine the Sum-of-Fraction of Engineered Trench #1 and all contributing isotopes

ISOTOPE	Engr. Trench #1 Activity (Ci)	Engr. Trench PA Limit (Ci)	Fraction Of PA Limit
Other Alpha	1.32E-02	No Limit	0.00E+00
AC228	1.08E-03	No Limit	0.00E+00
AG110M	2.40E-06	No Limit	0.00E+00
AL26	4.97E-11	No Limit	0.00E+00
AM241	1.87E-01	2.4E+02	7.81E-04
AM242M	3.33E-03	8.1E+02	4.11E-06
AM243	6.75E-04	8.2E-01	8.23E-04
Other Beta Gamma	1.12E-01	No Limit	0.00E+00
BA133	2.53E-06	No Limit	0.00E+00
BA137M	1.57E+01	No Limit	0.00E+00
BE7	4.38E-06	No Limit	0.00E+00
BI210	8.97E-04	No Limit	0.00E+00
BI211	4.67E-07	No Limit	0.00E+00
BI212	1.54E-03	No Limit	0.00E+00
BI214	1.26E-03	No Limit	0.00E+00
C14	5.03E-02	2.7E+00	1.86E-02
CD109	8.08E-08	No Limit	0.00E+00
CE144	3.52E-02	No Limit	0.00E+00
CF249	7.28E-06	6.9E+01	1.06E-07
CF250	1.10E-04	4.8E+04	2.30E-09
CF251	2.80E-05	5.2E+01	5.38E-07
CF252	4.70E-04	4.5E+06	1.05E-10
CL36	7.00E-05	No Limit	0.00E+00
CM242	2.13E-06	1.7E+05	1.25E-11
CM243	5.85E-05	1.8E+04	3.25E-09
CM244	1.25E-01	3.9E+02	3.20E-04
CM245	2.46E-04	3.7E+01	6.64E-06
CM246	4.36E-04	1.4E+02	3.11E-06
CM247	1.11E-15	6.5E-01	1.71E-15
CM248	3.47E-15	3.6E+01	9.64E-17
CO57	9.96E-04	No Limit	0.00E+00
CO58	6.07E-02	No Limit	0.00E+00
CO60	7.89E+00	7.3E+08	1.08E-08
CR51	8.68E-04	No Limit	0.00E+00
CS134	2.86E-02	No Limit	0.00E+00
CS137	2.74E+01	2.1E+04	1.30E-03
EU152	1.11E-01	No Limit	0.00E+00
EU154	6.84E-02	8.1E+06	8.45E-09
EU155	9.22E-05	No Limit	0.00E+00
FE55	2.88E+01	No Limit	0.00E+00
FE59	9.01E-04	No Limit	0.00E+00
H3	9.41E-01	6.3E+00	1.49E-01
HF175	7.63E-08	No Limit	0.00E+00
HF181	3.10E-04	No Limit	0.00E+00
I129 Generic	3.76E-05	1.0E-03	3.76E-02
I129 F-WTU Dowex 21K	1.33E-03	4.2E-01	3.16E-03
I129 H-Area Dowex 21K	9.04E-04	1.0E+00	9.04E-04

I129 F-Area CG-8	1.56E-06	3.2E-03	4.88E-04
I129 H-Area CG-8	9.57E-06	2.3E-02	4.16E-04
I129 F-Area Filtercake	3.60E-05	3.2E-03	1.13E-02
IN113M	1.10E-06	No Limit	0.00E+00
K40	1.12E-04	No Limit	0.00E+00
KR85	2.56E-02	No Limit	0.00E+00
MN54	1.41E-01	No Limit	0.00E+00
MO93	2.08E-03	No Limit	0.00E+00
NA22	8.73E-08	No Limit	0.00E+00
NB93M	1.83E-02	No Limit	0.00E+00
NB94	1.27E-03	No Limit	0.00E+00
NB95	4.92E-03	No Limit	0.00E+00
NB95M	1.05E-05	No Limit	0.00E+00
NI59	4.92E-02	1.5E+02	3.28E-04
NI63	4.50E+00	2.8E+05	1.61E-05
NP237	1.78E-03	4.8E-02	3.71E-02
NP239	5.87E-05	No Limit	0.00E+00
PA233	4.34E-06	No Limit	0.00E+00
PA234	2.78E-03	No Limit	0.00E+00
PA234M	9.09E-02	No Limit	0.00E+00
PB210	9.03E-04	No Limit	0.00E+00
PB212	1.52E-03	No Limit	0.00E+00
PB214	1.26E-03	No Limit	0.00E+00
PM147	2.04E-01	No Limit	0.00E+00
PO210	9.03E-04	No Limit	0.00E+00
PO212	5.56E-04	No Limit	0.00E+00
PO214	1.26E-03	No Limit	0.00E+00
PO216	1.52E-03	No Limit	0.00E+00
PO218	1.26E-03	No Limit	0.00E+00
PR144	2.26E-02	No Limit	0.00E+00
PR144M	4.01E-05	No Limit	0.00E+00
PU238	8.09E-01	1.4E+04	5.78E-05
PU239	3.36E-01	1.3E+02	2.59E-03
PU240	1.09E-01	1.3E+02	8.35E-04
PU241	2.50E+00	7.9E+03	3.17E-04
PU242	1.39E-03	1.3E+02	1.07E-05
PU244	1.87E-15	9.7E+00	1.92E-16
RA224	1.52E-03	No Limit	0.00E+00
RA226	1.28E-03	No Limit	0.00E+00
RA228	5.81E-04	No Limit	0.00E+00
RH103M	2.66E-09	No Limit	0.00E+00
RH106	4.42E-03	No Limit	0.00E+00
RN220	1.52E-03	No Limit	0.00E+00
RN222	1.26E-03	No Limit	0.00E+00
RU103	2.66E-09	No Limit	0.00E+00
RU106	1.15E-02	No Limit	0.00E+00
SB125	6.97E-02	No Limit	0.00E+00
SB126M	1.01E-05	No Limit	0.00E+00
SE79	3.20E-03	1.2E+02	2.67E-05
SM151	1.27E-04	6.1E+06	2.08E-11
SN113	1.10E-06	No Limit	0.00E+00
SN119M	6.34E-07	No Limit	0.00E+00

SN126	3.20E-05	4.0E+01	8.01E-07
SR85	1.29E-03	No Limit	0.00E+00
SR90	5.24E+00	5.1E+02	1.03E-02
TA182	1.56E-06	No Limit	0.00E+00
TC99	1.88E-02	6.1E-01	3.09E-02
TE125M	9.52E-04	No Limit	0.00E+00
TH228	1.53E-03	No Limit	0.00E+00
TH230	5.77E-04	No Limit	0.00E+00
TH231	2.41E-03	No Limit	0.00E+00
TH232	7.49E-04	1.4E+00	5.35E-04
TH234	9.38E-02	No Limit	0.00E+00
TL208	3.08E-04	No Limit	0.00E+00
U232	9.10E-04	5.9E+01	1.54E-05
U233	7.33E-02	1.9E+00	3.86E-02
U233 Depleted	3.53E-03	1.9E+00	1.86E-03
U234	1.49E-01	1.1E+01	1.35E-02
U235	2.78E-03	8.0E+00	3.48E-04
U235 Depleted	3.20E-03	8.0E+00	4.00E-04
U236	8.35E-03	2.0E+00	4.17E-03
U238	9.89E-02	7.4E+00	1.34E-02
Y90	5.04E+00	No Limit	0.00E+00
ZN65	4.83E-04	No Limit	0.00E+00
ZR93	7.59E-06	2.6E+01	2.92E-07
ZR95	9.29E-04	No Limit	0.00E+00
		Sum-of-Fraction	**3.80E-01**

Identify the Primary Isotopes Of Concern (>1% disposed in the Engr. Trench #1)

Primary Isotopes Of Concern	Engr. Trench #1 Activity (Ci)	Engr. Trench PA Limit (Ci)	Fraction Of PA Limit
H3	9.41E-01	6.3E+00	1.49E-01
U233	7.33E-02	1.9E+00	3.86E-02
I129 Generic	3.76E-05	1.0E-03	3.76E-02
NP237	1.78E-03	4.8E-02	3.71E-02
TC99	1.88E-02	6.1E-01	3.09E-02
C14	5.03E-02	2.7E+00	1.86E-02
U234	1.49E-01	1.1E+01	1.35E-02
U238	9.89E-02	7.4E+00	1.34E-02
I129 F-Area Filtercake	3.60E-05	3.2E-03	1.13E-02
SR90	5.24E+00	5.1E+02	1.03E-02
		Sum-of-Fraction	**3.61E-01**

<u>Determine the Sum-of-Fraction of Slit Trenches #1 and all contributing isotopes</u>

ISOTOPE	Slit Trenches #1 Activity (Ci)	Slit Trenches PA Limit (Ci)	Fraction Of PA Limit
Other Alpha	8.10E-04	No Limit	0.00E+00
AC228	3.06E-03	No Limit	0.00E+00
AM241	3.70E-02	2.4E+02	1.54E-04
AM242M	7.36E-03	8.1E+02	9.09E-06
AM243	5.81E-05	8.2E-01	7.09E-05
Other Beta Gamma	1.13E-01	No Limit	0.00E+00
BA137M	5.18E+00	No Limit	0.00E+00
BI211	2.47E-05	No Limit	0.00E+00
BI212	2.40E-03	No Limit	0.00E+00
BI214	7.04E-05	No Limit	0.00E+00
C14	6.09E-02	2.7E+00	2.25E-02
CD109	2.47E-04	No Limit	0.00E+00
CE144	2.86E-03	No Limit	0.00E+00
CF249	6.66E-06	6.9E+01	9.65E-08
CF251	6.60E-05	5.2E+01	1.27E-06
CF252	1.43E-06	4.5E+06	3.18E-13
CM242	6.06E-05	1.7E+05	3.57E-10
CM243	6.92E-06	1.8E+04	3.84E-10
CM244	3.83E-02	3.9E+02	9.83E-05
CM245	2.56E-07	3.7E+01	6.93E-09
CM246	1.44E-06	1.4E+02	1.03E-08
CM247	1.43E-06	6.5E-01	2.20E-06
CM248	1.43E-06	3.6E+01	3.98E-08
CO58	2.88E-01	No Limit	0.00E+00
CO60	4.69E+00	7.3E+08	6.43E-09
CR51	7.11E-05	No Limit	0.00E+00
CS134	4.16E-04	No Limit	0.00E+00
CS135	7.09E-08	1.6E+01	4.43E-09
CS137	7.01E+00	2.1E+04	3.34E-04
EU152	2.67E-04	No Limit	0.00E+00
EU154	9.68E-04	8.1E+06	1.20E-10
EU155	1.75E-05	No Limit	0.00E+00
FE55	7.80E+00	No Limit	0.00E+00
FE59	1.58E-03	No Limit	0.00E+00
H3	4.71E+00	6.3E+00	7.48E-01
HF181	4.65E-04	No Limit	0.00E+00
I129 Generic	1.87E-05	1.0E-03	1.87E-02
I129 H Area Filtercake	2.77E-07	4.0E-02	6.93E-06
I129 F Area Filtercake	8.14E-05	3.2E-03	2.55E-02
K40	3.96E-03	No Limit	0.00E+00
KR85	5.67E-05	No Limit	0.00E+00
MN54	1.94E-01	No Limit	0.00E+00
MO93	1.15E-05	No Limit	0.00E+00
NA22	7.92E-07	No Limit	0.00E+00
NB93M	7.44E-02	No Limit	0.00E+00
NB94	1.08E-03	No Limit	0.00E+00
NB95	9.92E-03	No Limit	0.00E+00

NI59	2.24E-02	1.5E+02	1.49E-04
NI63	1.58E+00	2.8E+05	5.65E-06
NP237	1.09E-03	4.8E-02	2.26E-02
PA233	4.66E-06	No Limit	0.00E+00
PA234	3.88E-03	No Limit	0.00E+00
PA234M	1.16E-01	No Limit	0.00E+00
PB212	2.62E-03	No Limit	0.00E+00
PB214	7.42E-05	No Limit	0.00E+00
PD107	1.10E-07	4.4E+01	2.51E-09
PM147	5.89E-02	No Limit	0.00E+00
PO212	1.50E-03	No Limit	0.00E+00
PO216	2.34E-03	No Limit	0.00E+00
PR144	3.08E-03	No Limit	0.00E+00
PR144M	6.19E-07	No Limit	0.00E+00
PU238	2.39E-01	1.4E+04	1.71E-05
PU239	2.48E-02	1.3E+02	1.90E-04
PU240	6.72E-03	1.3E+02	5.17E-05
PU241	2.12E-01	7.9E+03	2.68E-05
PU242	1.10E-04	1.3E+02	8.43E-07
PU244	2.35E-15	9.7E+00	2.43E-16
RA224	2.34E-03	No Limit	0.00E+00
RA226	3.14E-03	No Limit	0.00E+00
RA228	2.34E-03	No Limit	0.00E+00
RB87	8.59E-14	3.5E-01	2.46E-13
RH106	6.33E-05	No Limit	0.00E+00
RN220	2.34E-03	No Limit	0.00E+00
RU106	2.34E-03	No Limit	0.00E+00
SB125	4.62E-02	No Limit	0.00E+00
SB126	1.76E-07	No Limit	0.00E+00
SB126M	1.76E-07	No Limit	0.00E+00
SE79	2.00E-04	1.2E+02	1.66E-06
SM151	1.32E-04	6.1E+06	2.16E-11
SN126	1.82E-04	4.0E+01	4.56E-06
SR85	9.23E-06	No Limit	0.00E+00
SR90	3.24E+00	5.1E+02	6.35E-03
TA182	1.59E-07	No Limit	0.00E+00
TC99	4.96E-03	6.1E-01	8.14E-03
TE125M	8.85E-03	No Limit	0.00E+00
TH228	2.34E-03	No Limit	0.00E+00
TH230	2.87E-04	No Limit	0.00E+00
TH231	1.54E-03	No Limit	0.00E+00
TH232	2.34E-03	1.4E+00	1.67E-03
TH234	1.20E-01	No Limit	0.00E+00
TL208	8.57E-04	No Limit	0.00E+00
U232	1.18E-06	5.9E+01	2.00E-08
U233	3.08E-04	1.9E+00	1.62E-04
U233 Depleted	5.88E-03	1.9E+00	3.09E-03
U234	6.62E-02	1.1E+01	6.02E-03
U235	3.33E-04	8.0E+00	4.17E-05
U235 Depleted	5.37E-03	8.0E+00	6.71E-04
U236	1.89E-03	2.0E+00	9.43E-04
U238	1.24E-01	7.4E+00	1.67E-02

Y90	3.18E+00	No Limit	0.00E+00
ZN65	4.78E-02	No Limit	0.00E+00
ZR93	2.71E-05	2.6E+01	1.04E-06
ZR95	4.54E-03	No Limit	0.00E+00
		Sum-of-Fraction	**8.82E-01**

Identify the Primary Isotopes Of Concern (>1% disposed in the Slit Trenches #1)

Primary Isotopes Of Concern	Slit Trenches #1 Activity (Ci)	Slit Trenches PA Limit (Ci)	Fraction Of PA Limit
H3	4.71E+00	6.3E+00	7.48E-01
I129 F Area Filtercake	8.14E-05	3.2E-03	2.55E-02
NP237	1.09E-03	4.8E-02	2.26E-02
C14	6.09E-02	2.7E+00	2.25E-02
I129 Generic	1.87E-05	1.0E-03	1.87E-02
U238	1.24E-01	7.4E+00	1.67E-02
		Sum-of-Fraction	**8.54E-01**

Determine the Sum-of-Fraction of Slit Trenches #2 and all contributing isotopes

ISOTOPE	Slit Trenches #2 Activity (Ci)	Slit Trenches PA Limit (Ci)	Fraction Of PA Limit
Other Alpha	1.24E-03	No Limit	0.00E+00
AM241	5.42E-02	2.4E+02	2.26E-04
AM242M	2.31E-02	8.1E+02	2.85E-05
AM243	1.25E-04	8.2E-01	1.52E-04
Other Beta Gamma	7.03E-01	No Limit	0.00E+00
BA133	8.29E-06	No Limit	0.00E+00
BA137M	1.40E+01	No Limit	0.00E+00
BI210	1.30E-06	No Limit	0.00E+00
BI214	6.49E-06	No Limit	0.00E+00
C14	1.20E-01	2.7E+00	4.44E-02
CE144	1.73E-02	No Limit	0.00E+00
CF249	1.24E-06	6.9E+01	1.79E-08
CF250	9.61E-07	4.8E+04	2.00E-11
CF251	1.42E-04	5.2E+01	2.72E-06
CF252	2.45E-06	4.5E+06	5.44E-13
CL36	1.06E-05	No Limit	0.00E+00
CM242	1.65E-04	1.7E+05	9.73E-10
CM243	3.75E-06	1.8E+04	2.08E-10
CM244	4.84E-02	3.9E+02	1.24E-04
CM245	1.15E-06	3.7E+01	3.09E-08
CM246	1.07E-06	1.4E+02	7.64E-09
CM247	2.37E-09	6.5E-01	3.65E-09
CM248	2.37E-09	3.6E+01	6.59E-11
CO58	5.04E+00	No Limit	0.00E+00
CO60	1.95E+01	7.3E+08	2.67E-08
CR51	1.23E-02	No Limit	0.00E+00
CS134	2.43E-04	No Limit	0.00E+00
CS135	1.18E-10	1.6E+01	7.35E-12
CS137	1.50E+01	2.1E+04	7.15E-04
EU152	6.45E-05	No Limit	0.00E+00
EU154	6.73E-03	8.1E+06	8.31E-10
EU155	8.56E-06	No Limit	0.00E+00
FE55	3.36E+01	No Limit	0.00E+00
FE59	3.60E-02	No Limit	0.00E+00
H3	6.00E-01	6.3E+00	9.53E-02
HF181	1.16E-02	No Limit	0.00E+00
I129 Generic	1.38E-05	1.0E-03	1.38E-02
I129 F-WTU Dowex 21K	4.32E-03	4.2E-01	1.03E-02
I129 F-Area CG-8	4.99E-05	3.2E-03	1.56E-02
I129 H-Area CG-8	1.18E-04	2.3E-02	5.15E-03
I129 ETF GT-73	8.34E-05	6.2E-01	1.35E-04
I129 F-Area Filtercake	2.56E-04	3.2E-03	8.01E-02
KR85	9.43E-06	No Limit	0.00E+00
MN54	9.98E-01	No Limit	0.00E+00
MO93	3.40E-07	No Limit	0.00E+00
NB93M	1.62E-01	No Limit	0.00E+00
NB94	2.26E-03	No Limit	0.00E+00

NB95	9.14E-02	No Limit	0.00E+00
NB95M	3.00E-10	No Limit	0.00E+00
NI59	3.57E-02	1.5E+02	2.38E-04
NI63	6.49E+00	2.8E+05	2.32E-05
NP237	1.54E-03	4.8E-02	3.22E-02
PA233	8.91E-06	No Limit	0.00E+00
PA234	8.58E-03	No Limit	0.00E+00
PA234M	1.08E+01	No Limit	0.00E+00
PB214	6.49E-06	No Limit	0.00E+00
PD107	1.83E-10	4.4E+01	4.16E-12
PM147	1.09E-02	No Limit	0.00E+00
PO210	1.30E-06	No Limit	0.00E+00
PO214	6.49E-06	No Limit	0.00E+00
PO218	6.49E-06	No Limit	0.00E+00
PR144	1.65E-02	No Limit	0.00E+00
PR144M	2.14E-07	No Limit	0.00E+00
PU238	3.50E-01	1.4E+04	2.50E-05
PU239	9.65E-02	1.3E+02	7.42E-04
PU240	2.79E-02	1.3E+02	2.15E-04
PU241	1.15E+00	7.9E+03	1.45E-04
PU242	3.91E-04	1.3E+02	3.00E-06
PU244	5.10E-15	9.7E+00	5.26E-16
RA226	6.49E-06	No Limit	0.00E+00
RB87	1.42E-16	3.5E-01	4.07E-16
RH106	1.21E-04	No Limit	0.00E+00
RN222	6.49E-06	No Limit	0.00E+00
RU106	5.64E-03	No Limit	0.00E+00
SB125	1.30E-01	No Limit	0.00E+00
SB126	2.92E-10	No Limit	0.00E+00
SB126M	2.92E-10	No Limit	0.00E+00
SE79	1.25E-04	1.2E+02	1.04E-06
SM151	2.06E-07	6.1E+06	3.37E-14
SN126	5.57E-07	4.0E+01	1.39E-08
SR85	1.39E-04	No Limit	0.00E+00
SR90	1.03E+00	5.1E+02	2.03E-03
TA182	5.10E-03	No Limit	0.00E+00
TC99	1.47E-02	6.1E-01	2.42E-02
TE125M	2.00E-02	No Limit	0.00E+00
TH228	3.10E-06	No Limit	0.00E+00
TH231	5.02E-03	No Limit	0.00E+00
TH232	3.53E-06	1.4E+00	2.52E-06
TH234	1.08E+01	No Limit	0.00E+00
U232	1.68E-07	5.9E+01	2.84E-09
U233	1.15E-03	1.9E+00	6.08E-04
U233 Depleted	1.92E-02	1.9E+00	1.01E-02
U234	1.37E-01	1.1E+01	1.25E-02
U234 M Area Glass	2.80E+00	4.9E+01	5.71E-02
U235	3.58E-04	8.0E+00	4.47E-05
U235 Depleted	1.35E-02	8.0E+00	1.69E-03
U235 M Area Glass	1.87E-01	3.7E+01	5.06E-03
U236	2.31E-04	2.0E+00	1.15E-04
U236 M Area Glass	1.42E-01	4.6E+03	3.09E-05

U238	3.10E-01	7.4E+00	4.19E-02
U238 M Area Glass	1.05E+01	2.0E+02	5.26E-02
Y90	1.01E+00	No Limit	0.00E+00
ZN65	1.33E-02	No Limit	0.00E+00
ZR93	2.26E-05	2.6E+01	8.70E-07
ZR95	4.23E-02	No Limit	0.00E+00
		Sum-of-Fraction	**5.08E-01**

Identify the Primary Isotopes Of Concern (>1% disposed in the Slit Trenches #2)

Primary Isotopes Of Concern	**Slit Trenches #2 Activity (Ci)**	**Slit Trenches PA Limit (Ci)**	**Fraction Of PA Limit**
H3	6.00E-01	6.3E+00	9.53E-02
I129 F-Area Filtercake	2.56E-04	3.2E-03	8.01E-02
U234 M Area Glass	2.80E+00	4.9E+01	5.71E-02
U238 M Area Glass	1.05E+01	2.0E+02	5.26E-02
C14	1.20E-01	2.7E+00	4.44E-02
U238	3.10E-01	7.4E+00	4.19E-02
NP237	1.54E-03	4.8E-02	3.22E-02
TC99	1.47E-02	6.1E-01	2.42E-02
I129 F-Area CG-8	4.99E-05	3.2E-03	1.56E-02
I129 Generic	1.38E-05	1.0E-03	1.38E-02
U234	1.37E-01	1.1E+01	1.25E-02
I129 F-WTU Dowex 21K	4.32E-03	4.2E-01	1.03E-02
U233 Depleted	1.92E-02	1.9E+00	1.01E-02
		Sum-of-Fraction	**4.90E-01**

Determine the Sum-of-Fraction of CIG Trench #1 and all contributing isotopes

ISOTOPE	CIG Trenches #1 Activity (Ci)	CIG Trenches #1 PA Limit (Ci)	Fraction Of PA Limit
Other Alpha	4.95E-05	No Limit	0.00E+00
AM241	1.46E-02	2.7E+02	5.41E-05
AM243	7.48E-04	No Limit	0.00E+00
Other Beta Gamma	4.71E-04	No Limit	0.00E+00
BA137M	1.90E+03	No Limit	0.00E+00
C14	2.15E-02	2.7E+00	7.96E-03
CE144	5.66E-03	No Limit	0.00E+00
CF249	8.77E-05	No Limit	0.00E+00
CF251	8.78E-05	No Limit	0.00E+00
CF252	8.76E-05	No Limit	0.00E+00
CM243	1.47E-04	No Limit	0.00E+00
CM244	1.96E-01	No Limit	0.00E+00
CM245	1.54E-05	No Limit	0.00E+00
CM246	8.76E-05	No Limit	0.00E+00
CM247	8.76E-05	No Limit	0.00E+00
CM248	8.76E-05	No Limit	0.00E+00
CO60	6.82E-03	2.1E+09	3.25E-12
CS134	1.91E-05	No Limit	0.00E+00
CS135	4.34E-06	2.3E+01	1.89E-07
CS137	2.01E+03	2.2E+06	9.13E-04
EU152	4.24E-06	No Limit	0.00E+00
EU154	4.85E-04	3.6E+07	1.35E-11
EU155	2.77E-03	No Limit	0.00E+00
FE55	8.99E-06	No Limit	0.00E+00
H3	2.81E+02	3.2E+05	8.79E-04
I129	4.16E-06	4.2E-04	9.91E-03
NI59	3.20E-04	2.5E+03	1.28E-07
NI63	3.34E-03	1.3E+06	2.57E-09
NP237	4.99E-04	No Limit	0.00E+00
PA233	5.42E-06	No Limit	0.00E+00
PA234M	5.73E-04	No Limit	0.00E+00
PD107	6.76E-06	1.8E+01	3.75E-07
PM147	5.45E-04	No Limit	0.00E+00
PR144	5.58E-03	No Limit	0.00E+00
PR144M	7.73E-07	No Limit	0.00E+00
PU238	1.10E-01	1.4E+04	7.83E-06
PU239	4.24E-02	1.3E+02	3.27E-04
PU240	1.67E-02	1.3E+02	1.28E-04
PU241	1.99E-01	8.0E+03	2.48E-05
PU242	3.12E-05	1.3E+02	2.40E-07
RB87	5.25E-12	No Limit	0.00E+00
RH106	1.39E-04	No Limit	0.00E+00
RU106	1.39E-04	No Limit	0.00E+00
SB125	1.51E-03	No Limit	0.00E+00
SB126	1.08E-05	No Limit	0.00E+00
SB126M	1.08E-05	No Limit	0.00E+00
SE79	3.32E-04	8.1E+01	4.09E-06

SM151	7.59E-03	3.1E+07	2.45E-10
SN126	1.55E-05	5.2E+00	2.99E-06
SR85	1.28E-06	No Limit	0.00E+00
SR90	5.26E-01	2.3E+05	2.29E-06
TC99	2.11E-04	3.5E-01	6.03E-04
TH231	6.11E-06	No Limit	0.00E+00
TH234	5.73E-04	No Limit	0.00E+00
U232	3.27E-08	1.7E+03	1.93E-11
U233	5.19E-05	4.1E+01	1.27E-06
U233 Depleted	7.87E-07	4.1E+01	1.92E-08
U234	1.07E-03	4.9E+01	2.19E-05
U235	2.10E-05	2.3E+01	9.14E-07
U235 Depleted	1.67E-06	2.3E+01	7.24E-08
U236	5.33E-05	4.6E+02	1.16E-07
U238	6.38E-04	1.2E+02	5.32E-06
Y90	5.17E-01	No Limit	0.00E+00
ZR93	1.02E-03	1.5E+01	6.78E-05
		Sum-of-Fraction	**2.09E-02**

Identify the Primary Isotopes Of Concern (>1% disposed in the CIG Trenches #1)

Primary Isotopes Of Concern	CIG Trenches #1 Activity (Ci)	CIG Trenches #1 PA Limit (Ci)	Fraction Of PA Limit
None			

Determine the Sum-of-Fraction of NR Disposal Pad all contributing isotopes

ISOTOPE	NR Disposal Pad Activity (Ci)	NR Disposal Pad PA Limit (Ci)	Fraction Of PA Limit
Other Alpha	5.73E+00	No Limit	0.00E+00
AG110M	2.60E-02	No Limit	0.00E+00
AM241	7.40E-02	6.6E+04	1.12E-06
AM242M	1.25E-03	No Limit	0.00E+00
AM243	1.51E-03	7.5E+02	2.02E-06
Other Beta Gamma	6.29E+03	No Limit	0.00E+00
BA133	2.09E-03	No Limit	0.00E+00
BA137M	3.79E+00	No Limit	0.00E+00
C14	6.68E+01	7.7E+02	8.67E-02
CD109	8.08E-06	No Limit	0.00E+00
CE144	3.47E+00	No Limit	0.00E+00
CF249	1.95E-10	1.4E+05	1.39E-15
CF251	4.33E-12	No Limit	0.00E+00
CL36	1.27E-02	No Limit	0.00E+00
CM242	8.20E-01	No Limit	0.00E+00
CM243	1.14E-03	No Limit	0.00E+00
CM244	1.19E-01	7.1E+04	1.67E-06
CM245	8.00E-06	5.7E+03	1.40E-09
CM246	3.85E-06	1.0E+20	3.85E-26
CM247	8.30E-12	2.7E+03	3.07E-15
CM248	2.58E-11	1.7E+06	1.52E-17
CO58	2.76E+03	No Limit	0.00E+00
CO60	4.80E+04	No Limit	0.00E+00
CR51	1.97E+01	No Limit	0.00E+00
CS134	1.31E+00	No Limit	0.00E+00
CS135	3.55E-05	2.8E+07	1.27E-12
CS137	4.03E+00	No Limit	0.00E+00
EU152	6.97E-06	No Limit	0.00E+00
EU154	2.73E-01	No Limit	0.00E+00
EU155	6.52E-02	No Limit	0.00E+00
FE55	4.60E+04	No Limit	0.00E+00
FE59	2.97E+00	No Limit	0.00E+00
H3	2.17E+01	2.9E+05	7.49E-05
HF181	4.00E+01	No Limit	0.00E+00
I129	4.38E-06	9.0E-04	4.87E-03
IN113M	5.86E+02	No Limit	0.00E+00
KR85	1.53E-01	No Limit	0.00E+00
MN54	2.50E+02	No Limit	0.00E+00
MO93	2.35E-01	5.2E+03	4.51E-05
NB93M	3.19E+01	No Limit	0.00E+00
NB94	3.35E+00	8.7E+03	3.85E-04
NB95	1.89E+04	No Limit	0.00E+00
NB95M	1.01E+02	No Limit	0.00E+00
NI59	9.60E+02	1.2E+09	8.00E-07
NI63	1.12E+05	No Limit	0.00E+00
NP237	1.99E-06	1.3E+01	1.53E-07
PM147	2.53E+00	No Limit	0.00E+00

PR144	3.47E+00	No Limit	0.00E+00
PR144M	4.84E-02	No Limit	0.00E+00
PU238	1.39E-01	2.4E+07	5.78E-09
PU239	6.38E-02	5.9E+02	1.08E-04
PU240	4.06E-02	1.3E+03	3.12E-05
PU241	1.04E+01	9.3E+06	1.12E-06
PU242	1.78E-04	4.6E+02	3.86E-07
PU244	1.47E-11	4.5E+02	3.26E-14
RH103M	2.62E-02	No Limit	0.00E+00
RH106	4.88E+00	No Limit	0.00E+00
RU103	2.62E-02	No Limit	0.00E+00
RU106	4.90E+00	No Limit	0.00E+00
SB125	1.49E+04	No Limit	0.00E+00
SE79	1.98E-04	6.8E+02	2.91E-07
SM151	5.36E-02	No Limit	0.00E+00
SN113	5.86E+02	No Limit	0.00E+00
SN119M	2.77E+04	No Limit	0.00E+00
SN123	2.93E+02	No Limit	0.00E+00
SN126	4.62E-05	3.2E+02	1.44E-07
SR90	2.18E+00	2.2E+14	9.93E-15
TA182	4.00E+03	No Limit	0.00E+00
TC99	8.60E-02	8.8E+01	9.77E-04
TE125M	2.19E+03	No Limit	0.00E+00
TH232	5.52E-11	1.0E+20	5.52E-31
U232	1.05E-06	2.5E+12	4.18E-19
U233	7.52E-07	No Limit	0.00E+00
U234	9.19E-06	1.7E+03	5.41E-09
U235	1.60E-07	8.1E+02	1.97E-10
U236	6.54E-05	1.8E+03	3.63E-08
U238	9.35E-06	1.2E+02	7.79E-08
Y90	2.18E+00	No Limit	0.00E+00
ZN65	4.37E+00	No Limit	0.00E+00
ZR93	7.82E+00	8.8E+12	8.89E-13
ZR95	8.86E+03	No Limit	0.00E+00
		Sum-of-Fraction	**9.32E-02**

<u>Identify the Primary Isotopes Of Concern (>1% disposed in the NR Disposal Pad)</u>

Primary Isotopes Of Concern	**NR Disposal Pad Activity (Ci)**	**NR Disposal Pad PA Limit (Ci)**	**Fraction Of PA Limit**
C14	6.68E+01	7.7E+02	8.67E-02
		Sum-of-Fraction	**8.67E-02**

Comparison of Volume Filled to PA Sum-of-Fraction Filled for each EAV Facility

EAV Facility	Volume Filled (%)	PA Sum-of-Fraction Filled (%)
LAWV	61.4%	29.5%
ILV	42.9%	32.5%
Slit Trenches #1	95.0%	88.2%
Slit Trenches #2	40.0%	50.8%
Engr. Trench #1	37.5%	38.0%
CIG Trenches	10.0%	2.1%
NR Disposal Pad	13.0%	9.3%

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Key Words:
Interim Measures
Aquifer Source Node
Performance Assessment

Retention:
Permanent

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Prepared by:

Leonard B. Collard

May 2, 2003

Rev. 0

Westinghouse Savannah River Company
Savannah River Site
Aiken, SC 29808

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where excellence is achieved

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LIST OF ACRONYMS AND ABBREVIATIONS

μCi	microcuries
Ci	curie
DOE	U.S. Department of Energy
E	exponential notation (e.g., 5E-10 = 5×10^{-10} = 0.0000000005)
ER	Environmental Restoration
ETF	Effluent Treatment Facility
ft	feet
g	gram
K_d	sorption coefficient
L	liters
Log	logarithm
m	meters
MCL	maximum contaminant level
ml	milliliters
PA	performance assessment
pCi	picocuries
SA	Special Analysis
U.S.	United States
WSRC	Westinghouse Savannah River Company
yr	year

1.0 EXECUTIVE SUMMARY

This study estimates impacts for potential modeling changes that have been studied or are scheduled to be studied during the current fiscal year, FY2003. The estimated impacts will become part of the Interim Measures Study that determines if inventory limits should be adjusted on an interim basis before completing all planned studies.

This report addresses the following modeling topics

- Aquifer Source Node Selection
- Point Sources
- Timing of Doses
- Quasi-3D Vadose Zone Trench Model

It is apparent that the inappropriate implementation of the aquifer-source-node selection process discovered for the Slit Trenches extended to other disposal facilities. The effects of appropriately applying the process are likely to be insignificant for the LAW vault and the Components-in-Grout (CIG) trenches. Peak well concentrations for the ILV are expected to increase by about 70% for aquifer source nodes in the tan clay. If the nodes above the tan clay are selected as the aquifer source nodes (93% and 94% saturated), then the peak well concentrations likely would increase by about 45%.

The effects of point sources are unknown for most facilities, because the effects depend on the quantity and distribution of the points sources which were not available for this report.. The only point source in Slit Trench Set 1 for which spatial distribution information currently exists is the H-3 in 232-F rubble. The Special Study (Flach 2003) of this rubble indicates that for this specific case where most of the activity in the waste is spread over about a 200 ft length of trench that is located away from the hypothetical well, that the point source increases the peak well concentration by about 6%.

For important nuclides in Slit Trench Set 2 that currently consume more than 1% of their own inventory limit, consideration of point sources for known concentrated wastes are expected to increase peak well concentrations by a factor of 2 to 3. F-Area CG-8 and F-Area Dowex 21K peak well concentrations are expected to increase by a factor of two, which could add about 0.03 to the current SOF of 0.51. The F-Area filtercake peak well concentration could increase by a factor of 3 that would add about 0.08 to the current SOF.

The Engineered Trench currently is being optimally filled with volume consumption and consumption of the inventory limit marching in lockstep. However, nuclides that consume most of the inventory limit have a dominant groundwater pathway. Thus they are sensitive to the effects of point sources. F-Area Filtercake is the only waste with a waste-specific Kd (for I-129) that is important in the Engineered Trench, but because its inventory is extremely limited, it should pose no problems. However, other important nuclides, such as H-3 (0.15 fraction), U-233, generic I-129, Np-237 and Tc-99 should be investigated to see if any major point sources exist from accepting highly concentrated wastes.

The timing of doses study with separate sums-of-fractions for separate pathways should allow substantial increases in the inventories of most wastes, especially for those that are dominated by a non-groundwater pathway or that have peak groundwater concentrations that occur after 100 years. However, the most dominant nuclide in most trenches, H-3, typically can only have its

inventory increased marginally. The most limiting case is in Slit Trench Set 1 where the fraction for H-3 is 0.75.

The Quasi-3D Vadose Zone model should have no impact on nuclides with a non-groundwater dominant pathway. For nuclides with a groundwater dominant pathway, the peak well concentrations could increase or decrease because heterogeneity can be more accurately captured along with end effects, which will affect the water flux through the system.

2.0 INTRODUCTION

This report covers several modeling topics for the FY2003 E-Area PA Interim Measures Assessment. These topics address modeling issues for past, present and future analyses.

3.0 AQUIFER SOURCE NODE SELECTION

3.1 Estimated Impacts of Aquifer Source Node Selection on other Exposure Pathways

Selecting a different set of aquifer source nodes and well nodes (described in Section 3.2.1) has no effect on other exposure pathways. The only connection between the groundwater pathway modeling and analyses for other exposure pathways is that the groundwater pathway results from vadose zone modeling are used to determine the fraction of the original inventory that remains at the time of a hypothetical intrusion. While that fraction remaining is typically slightly non-conservative (because a low Kd is normally used for the groundwater pathway), the fraction remaining is independent of where the contaminant flux at the water table is injected in the aquifer transport model.

3.2 Expected Results for Implementation of Improved Aquifer Source Node Selection in PA Models other than Slit Trenches

The method used in this report to investigate PA models other than Slit Trenches will be to maximize use of the best available information from Slit Trenches. In this section the definition and selection of aquifer source nodes will be presented, Slit Trench information will be described and that information will be extrapolated to other models.

3.2.1 Aquifer Source Node Definition and Selection

Aquifer source nodes are cells in the aquifer transport model where estimated contaminant fluxes from a vadose zone model are injected. The contaminant fluxes are recorded at the base of the vadose zone model that nominally represents the water table. Because the aquifer model actually extends to the ground surface, the contaminant fluxes are injected at interior cells.

Each disposal facility has a footprint that spans the footprint of multiple aquifer model cells. The selection of the aquifer model cells in the horizontal plane is a compromise that attempts to best match the size of the disposal facility footprint and its orientation. After selecting the horizontal location for each aquifer source cell, the vertical location is determined. The original algorithm for models was to select the uppermost cell in the column of cells containing the aquifer cell that was 99% saturated. (The X and Y coordinates did not change within a given column of cells in the aquifer models.)

This report uses only one of the criteria expressed in the aquifer source node report (Flach and Collard, 2003). The selected criterion is the saturation level that Flach and Collard (2003) set at 100%, but which is considered in this study as the 99% value originally used in the PA.

Because the PORFLOW aquifer transport model sets the saturations at unity, the saturations from the FACT aquifer flow model were used in this report. This report assumes that the horizontal location (X and Y coordinates) of the aquifer source cells as used in PA models is correct for each disposal facility.

The horizontal location (X and Y coordinates) was determined for each aquifer source node using PORFLOW aquifer transport model data. Those X and Y coordinates were used to select the appropriate cells from the FACT aquifer flow model data. The saturations for the column of FACT cells containing an aquifer source cell were scanned with a computer program and the cell that matched the criterion was selected. Source cell locations, saturations and volumes from the original analysis and from the work performed for this report are presented in Table 1. The left-hand side of Table 1 shows the indices for selecting aquifer source nodes for PA models along with their saturations and volumes. The right-hand side of the table shows values selected for this report. Total volumes and percentage differences are reported for each analysis.

Table 1. Source Node Information by Analysis

	PA Node/Well Node					**Adjusted Node**					**% Diff**
Desc	**I**	**J**	**K**	**Sat**	**Vol (ft^3)**	**I**	**J**	**K**	**Sat**	**Vol (ft^3)**	**Vol**
ILV results for source nodes in tan clay											
ILV	31	22	9	1.000	582,400	31	22	12	1.000	175,250	
ILV	32	22	8	1.000	546,720	32	22	12	1.000	155,450	
Total					1,129,120					330,700	-70.7
Well	32	24	8								
ILV results for source nodes in water table aquifer											
ILV	31	22	9	1.000	582,400	31	22	13	0.930	302,850	
ILV	32	22	8	1.000	546,720	32	22	13	0.940	323,120	
Total					1,129,120					625,970	-44.6
Well	32	24	8								
LAW	40	11	14	1.000	422,980	40	11	15	1.000	422,980	
LAW	41	11	14	1.000	428,300	41	11	15	1.000	428,320	
LAW	42	11	14	1.000	406,470	42	11	15	1.000	406,490	
LAW	40	12	13	1.000	415,830	40	12	15	1.000	415,820	
LAW	41	12	14	1.000	424,340	41	12	15	1.000	424,350	
LAW	42	12	14	1.000	415,180	42	12	15	1.000	415,220	
Total					2,513,100					2,513,180	0.0
Well	42	14	13								
CIG	36	18	12	1.000	313,450	36	18	14	0.999	307,380	
CIG	37	18	12	1.000	299,400	37	18	13	1.000	320,550	
CIG	37	19	12	1.000	347,650	37	19	13	1.000	295,870	
CIG	38	19	13	1.000	297,920	38	19	13	1.000	297,920	
CIG	38	20	13	1.000	284,300	38	20	13	1.000	284,300	
CIG	39	20	12	1.000	244,350	39	20	14	0.994	281,910	
Total					1,787,070					1,787,930	0.0
Well	38	22	11								

The Slit Trenches were examined by Flach and Collard (2003) and are discussed in Section 3.2.2. Results shown in Table 1 are discussed after the Slit Trenches.

3.2.2 Slit Trenches

Flach and Collard (2003) examined Slit Trenches, considering several alternatives for selecting the aquifer source nodes. In that study the alternative that only considered the proper application of the original PA criterion was Case 8, although the criterion of 99% saturation was increased to 100% saturation. For that case two PA source nodes at the 8 and 9levels vertically were elevated to level 13 (see Table 2). The well node was changed from 36,24,9 to 36,24,11, because the upward shift in the aquifer source nodes caused the 100-m node with the highest concentration to shift upward as well. Profiles of the PA cells and the cells for this report are shown in Figure 1.

Table 2. Aquifer Source and Well Nodes for PA Slit Trenches and Aquifer Modeling Study (Flach and Collard, 2003)

	PA			Aquifer Modeling Study		
Description	I	J	K	I	J	K
Source	34	20	11	34	20	12
Source	35	20	12	35	20	12
Source	35	21	12	35	21	12
Source	36	21	12	36	21	13
Source	36	22	9	36	22	13
Source	37	22	8	37	22	13
Well	36	24	9	36	24	11

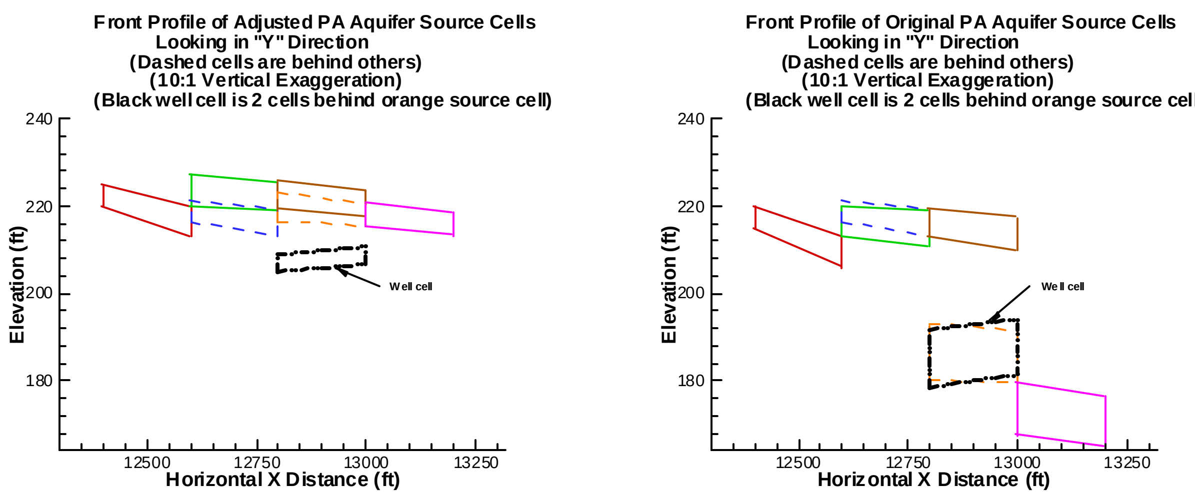

Figure 1. Aquifer Source Cell Comparison with Slit Trench PA Model

The single aquifer source node at level 9 (the dashed orange cell in the right-hand figure) likely dominated the peak concentration at the PA well node, which was also at level 9. For highly mobile contaminants such as H-3, contamination from the aquifer source node at level 8 would pass below the well node, while most contamination from the source nodes at the higher elevations arrived at the well node after the peak. The PA model thus invoked a discontinuous source where only 1 source cell contributed a significant amount of contamination to the peak well concentration. Flach and Collard (2003) reported a peak concentration that was about 2 times as high as the PA peak concentration. That result agreed with Collard (2002) who reported a similar peak concentration for a model that was refined and oriented to more accurately match the footprint and orientation of the Slit Trenches.

Another key aspect of the selection of the aquifer source nodes is that the aquifer source nodes in this report represent a volume that is 27% less than the volume used in the PA model, thus the contaminant source would be less diluted. However, the reduction in dilution by itself of 27% cannot explain the 100% increase in the peak concentration.

The “well node” from Flach and Collard (2003) is located in the tan clay layer, thus its selection may not be appropriate to represent a hypothetical well, although it may be appropriate to determine protection of the groundwater as a resource. Flach and Collard (2003) reported peak concentrations in a cell below the tan clay that were about 1.5 times the PA peaks.

In summary, the Slit Trench peak well concentration was primarily affected by two major factors. First, the number of source cells (1 in the PA and the 4 central nodes in this study) that likely contributed a significant amount of contamination to the peak well concentration affected the peak well concentration. The contribution of multiple cells depends on the plume interaction. Second, the amount of dilution introduced by the volume of the source cells affected the peak well concentration. The dilution effect will be more pronounced in source cells that contribute most of the contamination creating the peak well concentration.

3.2.3 LAW Vault and Components-in-Grout

Both the LAW vault and the Components-in-Grout models showed almost zero change in volume available for dilution. While all source nodes should be about one level higher (and likely the well node as well) the impact of these changes should be small and likely insignificant.

3.2.4 ILV

For the ILV, the source nodes are at levels 8 and 9, similar to the lower two Slit Trench source nodes. If more appropriate source nodes are selected based on the 99% saturated method, the dilution volume would decrease by about 70%, thus likely increasing the peak concentrations significantly. The well node for the PA model is at level 8, thus it should be affected by most of the contamination from both source nodes. Because the ILV should have all source nodes contributing, the only factor is the reduction in the dilution volume. Thus it is expected that the peak concentrations will increase by about 70% for the ILV analyses, if the source nodes were reselected based solely on the 99% saturated method.

The ILV source nodes selected by the 99% saturated method for this study are both at the top of the tan clay layer. The nodes directly above them in the water table aquifer are 93% and 94% saturated, thus they are essentially equally likely candidates for selection as source nodes. If the source nodes in the water table aquifer are selected, the dilution volume would decrease by about 45% and the peak concentrations would increase by about 45% also.

4.0 ARTIFICIAL DILUTION FROM FOOTPRINT MISMATCHING

4.1 Estimated Impact on ILV Results

The combination of aquifer source nodes provides a footprint where contamination from the vadose zone is introduced. That footprint ideally matches the footprint of the contaminant at the water table where it enters the aquifer. The footprint of the contaminant at the water table is somewhat larger than the footprint of the disposal facility because some lateral spreading of the contaminant plume occurs within the vadose zone.

For the PA modeling the contaminant flux at the water table from two ILVs was injected into two aquifer source nodes, each with a footprint of 200 ft by 200 ft with an area of 40,000 ft^2. The footprint of one ILV (see Figure 2.2-4 of the PA) is 75 m by 15 m with an area of 1125 m^2 (246 ft by 49 ft with an area of 12,109 ft^2). About 20 m separates the set of two projected ILVs (see Figure 2.2-1 of the PA). Thus the total footprint for the set of two projected ILVs is 75 m by 50 m with an area of 3750 m^2 (246 ft by 164 ft with an area of 40,365 ft^2). The ratio of the aquifer source nodes' footprint to the disposal facilities' footprint represents a conservative estimate of the amount of artificial dilution from combined footprint mismatching. That ratio is 80,000 / 40,365 or 1.98, indicating an artificial dilution of about 98% for the current model of two ILVs. If the peak well concentration increased by a factor of 1.98 the inventory limit would be reduced by the reciprocal of the concentration increase or 0.505.

However, if only the ILV closest to the hypothetical well were modeled or if a more refined aquifer model were employed, the effects of individual footprint mismatching would become apparent. In the first case the footprint mismatch would artificially dilute the contaminant by a factor of 40,000 / 12,109, or 3.30 (the footprint of one aquifer cell divided by the footprint of one ILV). In other words, a more representative model could generate a peak well concentration about 3.30 times as high as that shown in the PA (or a 230% increase). Because plume interaction between contaminants from two ILVs will not double the well concentrations and because the artificial dilution spreads contaminants closer to the well in addition to away from the well, the effects of the artificial dilution likely are only about 50% to 90% effective. Thus the peak well concentrations from a more representative model will likely be about 115% to 207% higher than the peak well concentrations shown in the PA.

5.0 POINT SOURCES

5.1 Estimated Impact of Point Sources on Groundwater Pathway Limits for Important Nuclides in Slit Trenches

Important nuclides are defined in this report as those that consume at least 1% of their inventory limit. That set of nuclides typically accounts for 90% or more of the inventory limit consumption as shown in Table 3. The CIG trench has no important nuclides, but the total inventory limit consumption is only about 2%. Inventories, inventory limits, fractions, sum-of-fractions, dominant pathways and time of peak well concentrations (where applicable) are presented for important nuclides by disposal facility in Appendix A.

Table 3. Contributions of Important Nuclides

Disposal Facility	Sum-of-Fractions for Important Nuclides	Sum-of-Fractions for all Nuclides	Ratio of SOF for Important Nuclides to all Nuclides
Slit Trench set 1	0.854	0.882	0.97
Slit Trench set 2	0.490	0.508	0.96
Engineered Trench	0.361	0.380	0.95
CIG Trench	0.000	0.021	0
LAW Vault	0.262	0.295	0.89
ILV	0.305	0.325	0.94
Naval Reactor Pad	0.087	0.093	0.94

For the groundwater pathway, the concentration profile at the hypothetical 100-m well can change significantly if point sources are considered. Collard (2002) showed that if the entire inventory limit based on a distributed source were concentrated in 1/500th of the trench volume and were located close to the 100-m well, then the peak well concentrations could increase by a factor of about 8. On the other hand, in some cases concentrating the waste, but locating it at the farthest distance from the 100-m well could slightly decrease the peak well concentrations. The first point source study was a parametric study, while the point source study for the current year focused on actual contaminant inventory distributions within the Slit Trenches.

5.1.1 Slit Trench Set 1

Examining inventory limit consumption by radionuclide, it is evident that the dominating radionuclide for the Slit Trench set 1 is H-3 (see Table 4 and Table A-1). In that facility the H-3 fraction is 0.75 versus a sum-of-fractions of 0.88. Slit Trench set 1 is 95% filled (see Table 5) on a volumetric basis, implying that the H-3 fraction would increase to 0.79 for a full trench if the trench filling continued at the same rate (the sum-of-fractions for a full trench would be 0.93).

Table 4. Inventory Limit Consumption for Slit Trench Set #1

Contaminant	Slit Trench Set #1 Fraction	Dominant Pathway	Fraction if 100% filled by volume
H3	7.48E-01	Gw	7.87E-01
I129 F-Area Filtercake	2.55E-02	Gw	2.68E-02
NP237	2.26E-02	Gw	2.38E-02
C14	2.25E-02	Air	2.37E-02
I129 Generic	1.87E-02	Gw	1.97E-02
U238	1.67E-02	Gw	1.76E-02

Table 5. Volume Consumption and Inventory Limit Consumption by Disposal Facility

EAV Facility	Volume Filled (%)	PA Sum-of-Fraction Filled (%)
LAWV	61.4%	29.5%
ILV	42.9%	32.5%
Slit Trenches #1	95.0%	88.2%
Slit Trenches #2	40.0%	50.8%
Engr. Trench #1	37.5%	38.0%
CIG Trenches	10.0%	2.1%
NR Disposal Pad	13.0%	9.3%

The main tritium source in Slit Trench set 1 is the rubble from the 232-F building. This source is not highly concentrated because it is spread over portions of two trenches. A study of that rubble as a point source has been completed where the effect of the point source increased the peak well concentration by about 6% (Flach, 2003). The effect of the point source was calculated by subtracting the effect of changing the aquifer source node locations from the total change relative to the PA. In that study, the release rate of H-3 from the rubble was altered which generated a peak well concentration that was about 69% of the peak well concentration for generic H-3 in the PA.

5.1.2 Slit Trench Set 2

Slit Trench set 2 inventory limit consumption is less dominated by H-3. H-3 currently consumes about 10% of the inventory limit (see Table 6), while I-129 on F-Area Filtercake waste consumes about 8%. For nuclides that consume 1% or more of the inventory, five are known to be concentrated and have received special treatment by having Kds (or leach rates) measured for specific waste forms. Those nuclides and their waste forms are presented in Table 7.

Table 6. Inventory Limit Consumption for Slit Trench Set #2

	Slit Trench Set #2		
Contaminant	**Current Fraction**	**Dominant Pathway**	**Fraction if 100% filled by volume**
H3	9.53E-02	Gw	2.38E-01
I129 F-Area Filtercake	8.01E-02	Gw	2.00E-01
U234 M Area Glass	5.71E-02	Radon	1.43E-01
U238 M Area Glass	5.26E-02	Resident	1.32E-01
C14	4.44E-02	Air	1.11E-01
U238	4.19E-02	Gw	1.05E-01
NP237	3.22E-02	Gw	8.04E-02
TC99	2.42E-02	Gw	6.04E-02
I129 F-Area CG-8	1.56E-02	Gw	3.90E-02
I129 Generic	1.38E-02	Gw	3.46E-02
U234	1.25E-02	Gw	3.12E-02
I129 F-WTU Dowex 21K	1.03E-02	Gw	2.57E-02
U233 Depleted	1.01E-02	Gw	2.53E-02

Table 7. Slit Trench Set 2 Inventory Limit Consumption for Concentrated Wastes

Nuclide	Waste Form	Current Inventory Limit Consumption (%)	Dominant Pathway
I-129	F-Area filtercake	8	Gw
U-234	M-Area glass	6	Radon
U-238	M-Area glass	5	Resident
I-129	F-Area CG-8	2	Gw
I-129	F-Area Dowex 21K	1	Gw

For the concentrated wastes in Slit Trench set 2 the M-Area glass is not dominated by the groundwater pathway, thus it will not be considered further. The F-Area CG-8 waste has an I-129 Kd of 50 ml/g while the F-Area Dowex 21K waste has an I-129 Kd of 6800 ml/g. The ratio of inventory limit consumption to volume consumption (i.e., the inventory concentration factor) for the projected inventories of these wastes are as follows:

Waste	Inventory Conc. Factor
I-129 on F-Area CG-8	22
I-129 on F-Area Dowex 21K	15

The high concentration factors indicate the peak well concentration could increase by a factor of 4 or 5, because waste with an inventory concentrated at 12.5X the normal inventory and located near the hypothetical well had a peak well concentration that increased by a factor of about 3.5 (Collard, 2002). However, the extremely low quantity of these wastes (each projected to consume less than 4% of its inventory limit for a full trench) makes this unlikely because there will not be sufficient inventory to sustain the peak. It is more likely that the peak well concentration will increase by a factor of about 2, but if the waste is located far from the well the factor will likely be much less.

The inventory concentration factor for the I-129 on F-Area filtercake is 16 and its Kd is about 57 ml/g. The current inventory limit consumption is 8% for the F-Area filtercake. No future waste of this type is expected to be generated. This quantity of inventory is still higher than the other concentrated wastes, thus it will support a more sustained peak well concentration and the peak well concentration may increase by a factor of about 3.

5.2 Estimated Impact of Point Sources on other Pathway Limits for Important Nuclides in Slit Trenches

Point sources are not a problem for intruder analyses. A uniform concentration is always applied in calculations. This approach is equivalent to applying a uniform probability for an intrusion event throughout the disposal facility. For example, if a facility consisted of 10 cubic feet, then a probability of 0.1 would be assigned to each cubic foot. If a uniform concentration of 1 Ci/ft^3 occurred, the net effect would be

$$10 \text{ (sections)} * 0.1 \text{ (probability of intrusion)} * 1 \text{ Ci/ ft}^3 = \text{net concentration of } 1 \text{ Ci/ ft}^3.$$

If all the contamination were concentrated in 1 section, then the net effect would be

$$9 \text{ (sections)} * 0.1 \text{ (probability of intrusion)} * 0 \text{ Ci/ ft}^3 +$$
$$1 \text{ (sections)} * 0.1 \text{ (probability of intrusion)} * 10 \text{ Ci/ ft}^3 = \text{net concentration of } 1 \text{ Ci/ ft}^3.$$

This approach works because scenarios that specifically consider hot spots, such as a handling scenario are not considered.

For the air pathway a point source is already considered, thus no changes in inventory limits for this pathway should occur.

For the radon pathway, U-234 was simulated as uniformly distributed throughout the waste (Section 4.3.4 of McDowell-Boyer, et al. 2002), although the waste thickness was 270 cm (about 9 ft, Section A.3.7 of Martin Marietta, et al. 1994). Because the waste thickness nominally is 16 ft the model effectively has a concentration factor of about 2, thus radon point sources are not likely to significantly affect inventory limits.

5.3 Extension of Estimated Impact of Point Sources in Slit Trenches to other Disposal Units

The impact on vaults will likely be less than the impact on Slit Trenches, because the vaults will serve to reduce the rate of water infiltration. The LAW vault has an inventory limit consumption that is less than half the volume consumption. The three most important contaminants in the LAW vault are generic I-129 (14% inventory limit consumption), C-14 (6% inventory limit consumption) and U-234 (3% inventory limit consumption). The dominant pathways for C-14 and U-234 are air and radon, respectively, thus they will not be considered further. Because the LAW vault radionuclides as a whole consume much less inventory than volume and because the vault will reduce the rate of water infiltration, any increase in the peak well concentration caused by inventory concentrations for generic I-129 likely will not have a significant impact on the sum-of-fractions. For example, if the peak well concentration for I-129 doubled, its fraction would similarly double to 0.28, but the sum-of-fractions would increase to 0.44 while the volume consumption is 61%.

The ILV has a current inventory limit consumption that is about 76% of the volume consumption. The two most important contaminants in the ILV are C-14 (15% inventory limit consumption) and generic I-129 (10% inventory limit consumption). The dominant pathway for C-14 is air, thus it will not be considered further.

For generic I-129 the effect of point sources is dependent on the quantity and distribution of the point sources. The recent Slit Trench set 1 study (Flach, 2003) indicates for that specific case of a "point source" that is primarily spread over a 200 ft length of trench and is relatively distant from the hypothetical well, the well concentration increased by about 6%. It is unknown what the quantity and distribution of major point sources is in the ILV, thus it is unknown what the impact is from those sources, if any exist for generic I-129.

The only nuclide in the ILV that consumes more than 1% of its inventory limit and has a waste-specific Kd is I-129 on ETF activated carbon. Currently 4 activated carbon vessels have been disposed that occupy about 4,000 cubic feet of the facility's 200,000 cubic feet, or about 2%. The percentage of the inventory limit consumption is about 1.4%, thus that waste actually consumes relatively less of its inventory limit than disposal volume and poses no problems.

For Components-in-Grout (CIG) point sources are the norm for operations. However, current consumption of the inventory limit is about 2% while the volume consumption is 10%, thus it appears that no problems are likely even if point sources are considered. Additionally, no radionuclide consumes more than 1% of its inventory limit. Any inventory concentration is likely to have minimal impact for those radionuclides that have current nonzero fractions. In a recent report, Collard and Cook (2003) recently developed limits for the full suite of radionuclides, and some contaminants will be assigned nonzero fractions that currently have none. It is unknown whether currently disposed contaminants can have a significant impact. If the consumption of the inventory limit remains less than half the volume consumption, then point sources likely will have minimal impact.

On the other hand, the K and L basin resins initially appear to pose a problem for disposal as CIG, even without considering the potential effects of point sources. However, that waste is projected to be produced through the year 2035, thus it is likely that the waste will be disposed in several CIG trenches. It is uncertain what the distribution of this waste will be in the CIG trenches, but the production over time will force at least a multitude of point sources. If the points sources are spread in a uniform pattern then they will essentially form a uniform distribution. If the K and L basin resins are isolated near the hypothetical well then the well concentrations can increase by a substantial, but unknown factor. That factor should be less than the factors developed for the first point source study of Slit Trenches (with a maximum factor of 8) because the grout will change the flow patterns. If the K and L basin resins are isolated away from the hypothetical well, then some benefit from the longer travel distance to the well relative to the travel distance for most other wastes in the CIG trenches will be achieved, to help compensate for the creation of a point source.

The Naval Reactors consume about 9% of the inventory limit and 13% of the volume. The dominant radionuclide is C-14 that consumes almost 9% of its inventory limit, with the groundwater pathway being dominant. From Section 2.4 of the Naval Reactor Special Analysis (Yu et al., 2002) the upper bound for the contamination in any reactor component is about twice the average, with the average being used to estimate the projected inventory. If part of the inventory had a maximum inventory concentration factor of 2X, the peak well concentration should increase by less than the 1.8 to 2.0 increase seen for the Slit Trenches, because only part of the inventory is concentrated. It is likely that the peak well concentration would increase by less than 1.5. For an increase by a factor of 1.5, the consumption of the inventory would be about 14% almost identical to the volume consumption of 13%.

The Engineered Trench is dominated by H-3 (15% inventory limit consumption) with four nuclides each consuming from 3 to 4% of its own inventory limit, U-233, generic I-129, Np-237 and Tc-99. As a whole the nuclides in the Engineered Trench consume 38% of the inventory limit and 38% of the volume. If the present rate of inventory limit consumption and volume consumption continue and significant concentrated sources are present, the potential for exceeding the inventory limits exists. F-Area filtercake is the only waste form that has one nuclide that consumes more that 1% of its inventory limit (I-129) and that receives special treatment by having its own waste-specific Kd. Because the F-Area filtercake consumes only about 1% of its inventory limit and because no more of that waste form is expected, it should not significantly affect the sum-of-fractions, even if concentration factors are considered. Currently no information on point sources for H-3, the dominating nuclide, is available. Because even a concentration factor of 2X (inventory limit consumption of 15% versus a volume consumption of 7.5%) for H-3 waste could pose a potential problem, the distribution of H-3 waste in the Engineered Trench should be investigated further.

6.0 TIMING OF DOSES

6.1 Description of Study Objectives

Currently peak well concentrations for each nuclide are superimposed, thus assuming that the peaks occur simultaneously. Additionally the dominant pathway for each nuclide is used to establish an inventory limit and the fractions of the inventory limit consumed. Fractions for each nuclide are added to form the sum-of-fractions even though the dominant pathways for those nuclides may differ.

The timing of doses study will eliminate some of these over-conservatisms. The objectives of the timing of doses study are first to directly consider the time when peak well concentrations occur for one nuclide relative to all other nuclides and second to separate the effects of each exposure pathway by creating a separate sum-of-fractions for each exposure pathway.

An example of the first objective is that for the Slit Trenches Set 1, H-3 (which consumes 75% of its inventory limit) has a peak well concentration at 9 years. Meanwhile Np-237 (which consumes 2% of its inventory limit) has a peak well concentration at 280 years. By 280 years the H-3 has essentially all decayed. At 9 years the well concentration for Np-237 is well below its peak. Superimposing the peaks at the same time introduces excessive conservatism that the timing of doses study will seek to eliminate.

An example of the second objective is that for the Slit Trenches H-3 is dominated by the groundwater pathway, while C-14 is dominated by the air pathway. Special limits are established for an independent air pathway, thus it is inappropriate to combine both pathways in a single sum-of-fractions, which again introduces excessive conservatism.

6.2 Estimated impact of Timing of Doses on Limits for Important Nuclides dominated by the Groundwater Pathway

The effects of applying a timed sum of doses can be estimated by separating nuclides into different subsets, representing different pathways or different times for peak well concentrations. The sum-of-fractions for each subset can be compared to unity to determine how much the combined inventory could ultimately increase. Additionally, the sum-of-fractions for each subset can be compared with the current facility sum-of-fractions to determine how much the combined inventory could increase to match the same facility sum-of-fractions. A table in each section below shows the subsets and potential inventory increases.

6.2.1 Slit Trench Set 1

The primary benefit from the timed sum of doses for nuclides in Slit Trench set 1 (see Table 8) is that H-3, which consumes 75% of its inventory limit, will be isolated from almost all other nuclides. The inventories for the subset of important nuclides with a dominant groundwater pathway that can be decoupled from H-3 (i.e., “late well peak” nuclides) could be increased so that their sum-of-fractions (SOF) approaches unity. The subset SOF currently is about 0.066, thus the subset inventories ultimately could be increased to about 15.2 times the current inventory (or 13.4X to match the current SOF of 0.882). This increase ignores other decouplings and peak time separations that occur among the subset of non-tritium nuclides.

The only nuclide other than H-3 that consumes more than 1% of its inventory limit and that has an early well peak concentration is generic I-129. Generic I-129 consumes about 2% of its inventory limit, so the combined effect from H-3 and generic I-129 (assuming simultaneous well peak concentrations) is to consume about 77% of the combined inventory limit. These two nuclides likely can be decoupled from the other nuclides (but probably not decoupled from each other), thus their inventories could be increased to about 1.3 times the current inventory (or 1.15X to match the current SOF of 0.882).

Table 8. Inventory Increase Factors for Slit Trench Set 1

			Inventory Increase Factors	
Subset	Nuclide	Fraction	SOF=1	Match Current SOF
Early Well peak	H-3	0.748	1.30	1.15
	Generic I-129	0.019	1.30	1.15
		0.767		
Late Well peak	I-129 F-Area Filtercake	0.026	15.2	13.4
	Np-237	0.023	15.2	13.4
	U-238	0.017	15.2	13.4
		0.066		
Air	C-14	0.023	43.5	38.3

6.2.2 Slit Trench Set 2

For the important nuclides in Slit Trench set 2 (see Table 9) with a dominant groundwater pathway; H-3, Tc-99 and generic I-129 have peak well concentrations at 9, 20 and 29 years, respectively. These three nuclides could be grouped into one subset. The individual nuclide fractions are H-3 (0.095), Tc-99 (0.024) and generic I-129 (0.014) that produce a subset SOF of 0.133. Inventories for these nuclides ultimately could be increased by 7.5 (or by 3.8 to match the current SOF of 0.508).

Table 9. Inventory Increase Factors for Slit Trench Set 2

			Inventory Increase Factors	
Subset	Nuclide	Fraction	SOF=1	Match Current SOF
Early Well peak	H-3	0.095	7.5	3.8
	Generic I-129	0.014	7.5	3.8
	Tc-99	0.024	7.5	3.8
		0.133		
Late Well peak	I-129 F-Area Filtercake	0.080	4.9	2.5
	Np-237	0.032	4.9	2.5
	U-238	0.042	4.9	2.5
	I-129 F-Area CG-8	0.016	4.9	2.5
	U-234	0.013	4.9	2.5
	I-129 F-Area Dowex 21k	0.010	4.9	2.5
	U-233 depleted	0.010	4.9	2.5
		0.203		
Air	C-14	0.044	22.7	11.5
Radon	U-234 M-Area Glass	0.057	17.5	8.9
Resident	U-238 M-Area Glass	0.053	18.9	9.6

For the nuclides that form the "Late Well Peak" subset, their SOF is 0.203. Thus increasing their inventory by a factor of 4.9 would produce a subset SOF of unity or increasing their inventories by a factor of 2.5 would match the current SOF for Slit Trench set 2. This subset consists of I-129 F-Area Filtercake, Np-237, U-238, I-129 F-Area CG-8, U-234, I-129 F-Area Dowex 21k and U-233 depleted.

6.2.3 Engineered Trench

For the important nuclides in the Engineered trench H-3 (see Table 10), Tc-99 and generic I-129 form the "Early Peak Well" subset with peaks occurring before 100 years. The subset SOF is 0.218. Thus the inventories for these three nuclides could be increased by 4.6 to produce a subset SOF of unity or the inventories could be increased by a factor of 1.7 to produce a subset SOF that would match the current Engineered Trench SOF OF 0.380.

For the nuclides that form the "Late Well Peak" subset, their SOF is 0.124. Thus increasing their inventory by a factor of 8.1 would produce a subset SOF of unity or increasing their inventories by a factor of 3.1 would match the current SOF for the Engineered Trench. This subset consists of I-129 F-Area Filtercake, Np-237, U-238, U-234, U-233 and Sr-90.

Table 10. Inventory Increase Factors for the Engineered Trench

			Inventory Increase Factors	
Subset	Nuclide	Fraction	SOF=1	Match Current SOF
Early Well peak	H-3	0.149	4.6	1.7
	Generic I-129	0.038	4.6	1.7
	Tc-99	0.031	4.6	1.7
		0.218		
Late Well peak	I-129 F-Area Filtercake	0.011	8.1	3.1
	Np-237	0.037	8.1	3.1
	U-238	0.013	8.1	3.1
	U-234	0.014	8.1	3.1
	U-233	0.039	8.1	3.1
	Sr-90	0.010	8.1	3.1
		0.124		
Air	C-14	0.019	52.6	20.0

6.2.4 CIG Trench

The Components-in-Grout trench does not contain any important nuclides that individually consume at least 1% of its inventory limit.

6.2.5 LAW Vault

For the LAW vault (see Table 11) no important nuclides exist that have peak well concentrations occurring before 100 years. For the nuclides that form the "Late Well Peak" subset, their SOF is 0.152. Thus increasing their inventory by a factor of 6.6 would produce a subset SOF of unity or increasing their inventories by a factor of 1.9 would match the current SOF for the LAW Vault of 0.295. This subset consists of generic I-129 and Tc-99.

Table 11. Inventory Increase Factors for the LAW Vault

			Inventory Increase Factors	
Subset	Nuclide	Fraction	SOF=1	Match Current SOF
Late Well peak	Generic I-129	0.135	6.6	1.9
	Tc-99	0.017	6.6	1.9
		0.152		
Air	C-14	0.057	17.5	5.2
Radon	U-234	0.031	32.3	9.5
Agriculture	U-233	0.011	45.5	13.4
	Pu-239	0.011	45.5	13.4
		0.022		

6.2.6 IL Vault

For the ILV (see Table 12) no important nuclides exist that have peak well concentrations occurring before 100 years. For the nuclides that form the "Late Well Peak" subset, their SOF is 0.110. Thus increasing their inventory by a factor of 9.1 would produce a subset SOF of unity or increasing their inventories by a factor of 3.0 would match the current SOF for the ILV of 0.325. This subset consists of generic I-129 and I-129 on ETF activated carbon.

Table 12. Inventory Increase Factors for ILV

			Inventory Increase Factors	
Subset	Nuclide	Fraction	SOF=1	Match Current SOF
Late Well peak	Generic I-129	0.096	9.1	3.0
	I-129 ETF Activated Carbon	0.014	9.1	3.0
		0.110		
Air	C-14	0.151	6.6	2.2
Radon	U-234	0.016	62.5	20.3
Resident	U-233 depleted	0.016	35.7	11.6
	U-238	0.012	35.7	11.6
		0.028		

6.2.7 Naval Reactor Pad

For the Naval Reactor Pad waste (see Table 13) no important nuclides exist that have peak well concentrations occurring before 100 years. C-14 forms the "Late Well Peak" subset, with a fraction of 0.087. Thus increasing its inventory by a factor of 11.5 would produce a subset SOF of unity or increasing its inventory by a factor of 1.1 would match the current SOF for the Naval Reactor Pad waste of 0.093.

Table 13. Inventory Increase Factors for the Naval Reactor Pad

			Inventory Increase Factors	
Subset	Nuclide	Fraction	SOF=1	Match Current SOF
Late Well peak	C-14	0.087	11.5	1.1

6.3 Estimated impact of Timing of Doses on Important Nuclides dominated by Non-Groundwater Pathways

6.4 Slit Trench Set 1

The only important nuclide for Slit Trench Set 1 (see Table 8) that has a dominant pathway other than groundwater is C-14 with an air pathway. C-14 has a fraction of 0.023. Thus increasing its inventory by a factor of 43.5 would produce a subset SOF of unity or increasing its inventory by a factor of 38.3 would match the current SOF for the Slit Trench set 1 of 0.882.

6.5 Slit Trench Set 2

The important nuclides for Slit Trench Set 2 (see Table 9) that have a dominant pathway other than groundwater are C-14 (air), U-234 M-Area Glass (radon) and U-238 M-Area Glass (resident).

C-14 has a fraction of 0.044. Thus increasing its inventory by a factor of 22.7 would produce a subset SOF of unity or increasing its inventory by a factor of 11.5 would match the current SOF for the Slit Trench set 2 of 0.508.

U-234 M-Area Glass has a fraction of 0.057. Thus increasing its inventory by a factor of 17.5 would produce a subset SOF of unity or increasing its inventory by a factor of 8.9 would match the current SOF for the Slit Trench set 2.

U-238 M-Area Glass has a fraction of 0.053. Thus increasing its inventory by a factor of 18.9 would produce a subset SOF of unity or increasing its inventory by a factor of 9.6 would match the current SOF for the Slit Trench set 2.

6.5.1 Engineered Trench

The only important nuclide for the Engineered Trench (see Table 10) that has a dominant pathway other than groundwater is C-14 with an air pathway. C-14 has a fraction of 0.019. Thus increasing its inventory by a factor of 52.6 would produce a subset SOF of unity or increasing its inventory by a factor of 20.0 would match the current SOF for the Engineered Trench of 0.380.

6.5.2 CIG Trench

The Components-in-Grout trench has no important nuclides that consume at least 1% of their inventory limit.

6.5.3 LAW Vault

The important nuclides for the LAW Vault (see Table 11) that have a dominant pathway other than groundwater are C-14 (air), U-234 (radon), U-233 (agriculture) and Pu-239 (agriculture).

C-14 has a fraction of 0.057. Thus increasing its inventory by a factor of 17.5 would produce a subset SOF of unity or increasing its inventory by a factor of 5.2 would match the current SOF for the LAW Vault of 0.295.

U-234 has a fraction of 0.031. Thus increasing its inventory by a factor of 32.3 would produce a subset SOF of unity or increasing its inventory by a factor of 9.5 would match the current SOF for the LAW Vault.

U-233 and Pu-239 form the agriculture subset with a combined SOF of 0.022. Thus increasing each nuclide's inventory by a factor of 45.5 would produce a subset SOF of unity or increasing its inventory by a factor of 13.4 would match the current SOF for the LAW Vault.

6.5.4 IL Vault

The important nuclides for the ILV (see Table 12) that have a dominant pathway other than groundwater are C-14 (air), U-234 (radon), U-233 depleted (resident) and U-238 (resident).

C-14 has a fraction of 0.151. Thus increasing its inventory by a factor of 6.6 would produce a subset SOF of unity or increasing its inventory by a factor of 2.2 would match the current SOF for the ILV of 0.325.

U-234 has a fraction of 0.016. Thus increasing its inventory by a factor of 62.5 would produce a subset SOF of unity or increasing its inventory by a factor of 20.3 would match the current SOF for the ILV.

U-233 depleted and U-238 form the resident subset with a combined SOF of 0.028. Thus increasing each nuclide's inventory by a factor of 35.7 would produce a subset SOF of unity or increasing its inventory by a factor of 11.6 would match the current SOF for the ILV.

6.5.5 Naval Reactor Pad

The only important nuclide (C-14) in the Naval Reactor Pad waste (see Table 13) has a dominant groundwater pathway.

7.0 QUASI-3D VADOSE ZONE SLIT TRENCH MODEL

7.1 Description of Study Objectives

The objective of the study is to incorporate information gained from the Vadose Zone Monitoring System (VZMS) program into a refined analysis of radionuclide migration from Slit Trench solid waste through the vadose and saturated zones to the 100 meter well. Characterization data acquired in the course of selecting VZMS monitoring locations provide information about subsurface variability in the vicinity of Slit Trench Set 1. The data can be used to assess how representative the current 2D PORFLOW vadose model is of an average cross-section through a Slit Trench, and whether a single vadose model adequately addresses the range of subsurface conditions observed at the site. The planned approach is to develop a 3D geological representation of the area, and to the extent warranted, develop a series of 2D vadose zone transport models capturing the variability in the geological model (quasi-3D approach). Tritium monitoring data from the VZMS can also be used to validate or improve PA model predictions of tritium leaching from solid waste forms and subsequent downward migration through the vadose zone.

7.2 Estimated Impact on Limits for Important Nuclides dominated by the Groundwater Pathway

The impact of incorporating VZMS information into a quasi-3D vadose model is unknown. Alternative 2D vadose models could result in reduced and/or increased fluxes at the water table. The VZMS tritium monitoring may validate the current PA model predictions, or indicate conservatism or non-conservatism.

7.3 Estimated Impact of Quasi-3D Vadose Zone Model on other Pathway Limits for Important Nuclides in Slit Trenches

As stated above the only interaction between the groundwater pathway models and other exposure pathways is that the groundwater pathway model establishes the fraction of the original waste inventory that remains at the time of a hypothetical intrusion. Modifying the vadose zone model to accommodate a 3^{rd} dimension should not affect the leaching performance of contaminants from the waste zone, thus implementing a quasi-3D vadose zone model should not significantly affect limits for other exposure pathways.

7.4 Extension of Estimated Impact of Quasi-3D Vadose Zone Model to other Disposal Units

As stated in the previous section, for non-groundwater exposure pathways use of a quasi-3D vadose zone model should have no effect on inventory limits.

Establishing a quasi-3D vadose zone model for other facilities will have much less impact on the groundwater pathway than such a model will have for trenches. The vaults tend to impede water infiltration, thus for the LAW vault and the ILV, any advantages of extending the work effort to encompass a quasi-3D vadose zone model at best will likely provide only marginal reductions in peak well concentrations and marginal increases in inventory limits.

Because the Components-in-Grout trench serves as a mini-vault, a performance change similar to that for the actual vaults is expected. After a quasi-3D model is developed for Slit Trenches it could be readily extended to include the CIG trench, however, new material properties for the CIG trench would need to be measured to capture the true essence of the modeling changes.

The Navel Reactor Pad waste could benefit from a quasi-3D vadose zone model. However, because the inventory limit consumption is currently at 9.3% while the disposal facility volume consumption is much higher at 13.0%, there appears to be no reason to increase the work effort for no significant improvement in disposal efficacy.

8.0 REFERENCES

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Appendix A – Important Nuclides by Disposal Facility

Table A-1. Slit Trench Set 1 Nuclides that Consume more than 1% of their Inventory Limit

Isotope	Activity (Ci)	Limit (Ci)	Fraction Of PA Limit	Dominant Pathway	Time of Peak Well Conc. (years)
H3	4.71E+00	6.3E+00	7.48E-01	Gw	9
I129 F-Area Filtercake	8.14E-05	3.2E-03	2.55E-02	Gw	~222
NP237	1.09E-03	4.8E-02	2.26E-02	Gw	280
C14	6.09E-02	2.7E+00	2.25E-02	Air	
I129 Generic	1.87E-05	1.0E-03	1.87E-02	Gw	29
U238	1.24E-01	7.4E+00	1.67E-02	Gw	1170
Sum-of-Fraction			**8.54E-01**		
Facility SOF			**8.82E-01**		

Table A-2. Slit Trench Set 2 Nuclides that Consume more than 1% of their Inventory Limit

Isotope	Activity (Ci)	Limit (Ci)	Fraction Of PA Limit	Dominant Pathway	Time of Peak Well Conc. (years)
H3	6.00E-01	6.3E+00	9.53E-02	Gw	9
I129 F-Area Filtercake	2.56E-04	3.2E-03	8.01E-02	Gw	~222
U234 M Area Glass	2.80E+00	4.9E+01	5.71E-02	Radon	
U238 M Area Glass	1.05E+01	2.0E+02	5.26E-02	Resident	
C14	1.20E-01	2.7E+00	4.44E-02	Air	
U238	3.10E-01	7.4E+00	4.19E-02	Gw	1170
NP237	1.54E-03	4.8E-02	3.22E-02	Gw	280
TC99	1.47E-02	6.1E-01	2.42E-02	Gw	20
I129 F-Area CG-8	4.99E-05	3.2E-03	1.56E-02	Gw	222
I129 Generic	1.38E-05	1.0E-03	1.38E-02	Gw	29
U234	1.37E-01	1.1E+01	1.25E-02	Gw	1170
I129 F-WTU Dowex 21K	4.32E-03	4.2E-01	1.03E-02	Gw	9087
U233 Depleted	1.92E-02	1.9E+00	1.01E-02	Gw	5880
Sum-of-Fraction			**4.90E-01**		
Facility SOF			**5.08E-01**		

Table A-3 Engineered Trench Nuclides that Consume more than 1% of their Inventory Limit

Isotope	Activity (Ci)	Limit (Ci)	Fraction Of PA Limit	Dominant Pathway	Time of Peak Well Conc. (years)
H3	9.41E-01	6.3E+00	1.49E-01	Gw	9
U233	7.33E-02	1.9E+00	3.86E-02	Gw	5880
I129 Generic	3.76E-05	1.0E-03	3.76E-02	Gw	29
NP237	1.78E-03	4.8E-02	3.71E-02	Gw	280
TC99	1.88E-02	6.1E-01	3.09E-02	Gw	20
C14	5.03E-02	2.7E+00	1.86E-02	Air	
U234	1.49E-01	1.1E+01	1.35E-02	Gw	1170
U238	9.89E-02	7.4E+00	1.34E-02	Gw	1170
I129 F-Area Filtercake	3.60E-05	3.2E-03	1.13E-02	Gw	~222
SR90	5.24E+00	5.1E+02	1.03E-02	Gw	320
Sum-of-Fraction			**3.61E-01**		
Facility SOF			**3.80E-01**		

Table A-4 CIG Trench Nuclides that Consume more than 1% of their Inventory Limit

Isotope	Activity (Ci)	Limit (Ci)	Fraction Of PA Limit	Dominant Pathway
None				
Facility SOF			**2.09E-02**	

Table A-5 LAW Vault Nuclides that Consume more than 1% of their Inventory Limit

Isotope	Activity (Ci)	Limit (Ci)	Fraction Of PA Limit	Dominant Pathway	Time of Peak Well Conc. (years)
I129 Generic	1.62E-04	1.2E-03	1.35E-01	Gw	1570
C14	1.54E-01	2.7E+00	5.72E-02	Air	
U234	3.71E+00	1.2E+02	3.09E-02	Radon	
TC99	1.00E-01	6.0E+00	1.67E-02	Gw	3270
U233	5.05E-01	4.5E+01	1.12E-02	Agriculture	
PU239	1.95E+00	1.8E+02	1.08E-02	Agriculture	
Sum-of-Fraction			**2.62E-01**		
Facility SOF			**2.95E-01**		

Table A-6 ILV Nuclides that Consume more than 1% of their Inventory Limit

Isotope	Activity (Ci)	Limit (Ci)	Fraction Of PA Limit	Dominant Pathway	Time of Peak Well Conc. (years)
C14	4.08E-01	2.7E+00	1.51E-01	Air	
I129 Generic	5.00E-05	5.2E-04	9.62E-02	Gw	1120
U233 Depleted	1.12E-01	7.0E+00	1.60E-02	Resident	
U234	2.37E-01	1.5E+01	1.58E-02	Radon	
I129 Activated Carbon	1.99E-03	1.4E-01	1.42E-02	Gw	1140
U238	5.75E-01	4.9E+01	1.17E-02	Resident	
Sum-of-Fraction			**3.05E-01**		
Facility SOF			**3.25E-01**		

Table A-7 Naval Reactor Disposal Pad Nuclides that Consume more than 1% of their Inventory Limit

Isotope	Activity (Ci)	Limit (Ci)	Fraction Of PA Limit	Dominant Pathway	Time of Peak Well Conc. (years)
C14	6.68E+01	7.7E+02	8.67E-02	Gw	905
Sum-of-Fraction			**8.67E-02**		
Facility SOF			**9.32E-02**		

Appendix B. Design Check

DESIGN CHECK INSTRUCTIONS AND REVIEWER COMMENTS FOR ESTIMATED IMPACTS FOR PERFORMANCE ASSESSMENT MODELING CHANGES PLANNED FOR 2003 FOR E-AREA LOW-LEVEL WASTE FACILITY DISPOSAL UNITS

Perform a design check for *ESTIMATED IMPACTS FOR PERFORMANCE ASSESSMENT MODELING CHANGES PLANNED FOR 2003 FOR E-AREA LOW-LEVEL WASTE FACILITY DISPOSAL UNITS*, WSRC-TR-2003-00193, Rev 0, May 2, 2003 following the general guidance provided in WSRC-IM-2002-00011.

Results of the design check are shown in red below each instruction.

1. Because this is likely the first of annual reports comment on the presentation format. The design checker has the advantage of reviewing the Interim Measures report and thus can better see how this report and the Interim Measures report should fold together to provide a consistent, yet concise set of documents.

   The format of the report evolved through discussions during the evaluation of estimated impacts. The report was organized around specific studies where new technical information was being developed. Within each section dealing with a study the estimated impacts were extended to an evaluation of impacts for all disposal units and pathways. The Interim Measurements Assessment readily utilized the information organized in this manner.

2. Check the APPROACH to ensure that the basic assumptions are correct. List any implicit assumptions that are not stated explicitly in the report. List any assumptions or factors that were omitted, especially those that may significantly affect the estimated results. List any equally viable, alternative assumptions and comment on their likely impact.

   Several recommendations were made for changes in assumptions and other bases for the estimates, which were incorporated into this report. One was to estimate the effects on peak well concentrations of selecting source nodes above the tan clay for the IL Vault, which were 93-94% saturated. This reduced the expected increase in peak well concentrations from 70% to 45%. Another was to consider the effects on IL Vault results of artificial dilution from footprint mismatching, which increased the peak well concentrations. A change for Slit Trench Set 1 was to produce a study that took credit for the slower release of tritium from 232-F rubble than assumed in the PA. This release was subsequently modeled in the recent study of E-Area Slit Trench Set 1 under as-filled conditions, which reduced the peak well tritium concentration.

3. Check the MATHEMATICS by

- Spot-checking the results and performing a complete check on results that suggest more than 10% changes

   All calculations that provided factors used in the Interim Measures Assessment report were checked by hand. In particular, the % Difference in Volume results from the Source Node Analysis in Table 1, and Inventory Increase Factors from the Timing of Doses, Tables 8-13, were checked. A few errors were noted in a marked up copy of the report and corrections were subsequently made by the author.

4. Check to ensure that the INPUTS are correct for
- Not applicable (see TRANSCRIPTION)

5. Check to ensure that the OUTPUTS are reasonable by
- Checking that all table output values are the correct order of magnitude

Outputs from the estimation report were checked for reasonableness. They appear to be the right order of magnitude.

6. TRANSCRIPTION:
- Ensure that values from other reports were copied correctly

Inputs to this report from the E-Area PA, Sink's radionuclide and volumetric fraction status report, and various Kd studies were spot checked. Only one or two errors were noted in marked up copies of the report and corrections were subsequently made by the author.

Outputs from the estimation report were checked to make sure they were correctly transcribed into the Interim Measures report. Several errors were noted and communicated to the Interim Measures report author and corrections were subsequently made by that author.

References to tables, inputs and results in the text of the report were cross-checked with report tables to ensure information was correctly transcribed for internal consistency.