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Special Analysis for the Disposal of the Idaho National Laboratory Waste Associated with the Unirradiated Light Water Breeder Reactor Waste Stream at the Area 5 Radioactive Waste Management Site, Nevada National Security Site, Nye County, Nevada

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Prepared by

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Acronyms and Abbreviations

Bq	becquerel
Bq m^{-3}	becquerel per cubic meter
Bq m^{-2} s^{-1}	becquerel per square meter per second
Co	cobalt
Cs	cesium
DOE	U.S. Department of Energy
Eu	europium
ft	foot/feet
FY	(Federal) fiscal year
Gd	gadolinium
GSD	Geometric standard deviation
INL	Idaho National Laboratory
LHS	Latin hypercube sample
LWBR	Light Water Breeder Reactor
m	meter(s)
mSv	millisievert(s)
NNSA/NFO	U.S. Department of Energy, National Nuclear Security Administration Nevada Field Office
NNSS	Nevada National Security Site
NSTec	National Security Technologies, LLC
PA	Performance Assessment
Pb	lead
Ra	radium
Rn	radon
RWMS	Radioactive Waste Management Site
SA	Special Analysis
SLB	Shallow land burial
SOFs	Sum of fractions
TED	Total effective dose
Th	thorium
Ti	titanium

WAC	Waste Acceptance Criteria
y	years

1.0 Executive Summary

This special analysis (SA) evaluates whether the Idaho National Laboratory (INL) Waste Associated with the Unirradiated Light Water Breeder Reactor (LWBR) waste stream (INEL167203QR1, Revision 0) is suitable for shallow land burial (SLB) at the Area 5 Radioactive Waste Management Site (RWMS) on the Nevada National Security Site (NNSS). Disposal of the INL Waste Associated with the Unirradiated LWBR waste meets all U.S. Department of Energy (DOE) Manual DOE M 435.1-1, “Radioactive Waste Management Manual,” Chapter IV, Section P performance objectives (DOE 1999). The INL Waste Associated with the Unirradiated LWBR waste stream is recommended for acceptance with the condition that the total uranium-233 (^{233}U) inventory be limited to 2.7E13 Bq (7.2E2 Ci).

2.0 Introduction

This SA evaluates disposal of the INL Waste Associated with the Unirradiated LWBR waste stream at the Area 5 RWMS on the NNSS. The waste stream requires an SA because the activity concentrations of thorium-229 (^{229}Th), ^{230}Th, ^{232}U, ^{233}U, and ^{234}U exceed their NNSS Waste Acceptance Criteria (WAC) Action Levels (U.S. Department of Energy, National Nuclear Security Administration Nevada Field Office [NNSA/NFO] 2016).

3.0 Analysis of Performance

The SA evaluates the long-term performance of the Area 5 RWMS with the INL Waste Associated with the Unirradiated LWBR waste stream disposed in a SLB disposal cell. The activity of long-lived progeny produced by the INL Waste Associated with the Unirradiated LWBR may continue to increase beyond the 1,000-year performance assessment (PA) compliance period. Therefore, PA results are evaluated for 10,000 years. A 120,000-year analysis is conducted to identify the time of peak waste stream impact.

3.1 Waste Description

The INL Waste Associated with the Unirradiated LWBR waste stream consists of pellet scrap, pellet powder, solidified pellet-grinding sludge, solidified neutralized laboratory solutions, metallurgical mounts, and miscellaneous debris produced during processing and analysis of unirradiated ^{233}U LWBR fuel pellets (INL 2017). The LWBR fuel pellets were a high-fired ceramic material manufactured from uranium oxide (UO_2)/thorium oxide (ThO_2) or UO_2/zirconium oxide (ZrO_2) mixtures.

The INL Waste Associated with the Unirradiated LWBR waste stream radionuclide activities are assumed to be lognormally distributed. The geometric mean of the distribution is assumed to be the product of the representative activity concentration and the total remaining volume, 132 m^3, as reported on the waste profile (INL 2017, Section D.5) (Table 1).

Table 1. INL Waste Associated with the Unirradiated LWBR Waste Stream Activity Concentration and Total Activity at the Time of Disposal Assumed for Performance Assessment Modeling

Nuclide	Geometric Mean Concentration (Bq m^{-3})	95th Percentile Concentration (Bq m^{-3})	Geometric Mean Activity (Bq)	95^{th} Percentile Activity (Bq)	Geometric Standard Deviation
^{227}Ac	5.0E+04	2.0E+06	6.6E+06	2.6E+08	9.35
^{210}Pb	4.0E+05	4.0E+06	5.3E+07	5.3E+08	4.04
^{239}Pu	3.0E+09	8.0E+09	4.0E+11	1.1E+12	1.81
^{226}Ra	2.0E+06	1.0E+07	2.6E+08	1.3E+09	2.65
^{229}Th	2.0E+11	3.0E+11	2.6E+13	4.0E+13	1.28
^{230}Th	2.0E+08	1.0E+09	2.6E+10	1.3E+11	2.65
^{232}Th	8.0E+09	3.0E+10	1.1E+12	4.0E+12	2.23
^{206}Tl	5.0E-01	5.0E+00	6.6E+01	6.6E+02	4.04
^{232}U	4.0E+11	8.0E+11	5.3E+13	1.1E+14	1.52
^{233}U†	2.0E+11	4.8E+11	2.7E+13	6.3E+13	1.68
^{234}U	3.0E+11	3.0E+12	4.0E+13	4.0E+14	4.04
^{235}U	1.0E+08	4.0E+09	1.3E+10	5.3E+11	9.35
^{236}U	5.0E+07	5.0E+08	6.6E+09	6.6E+10	4.04
^{238}U	6.0E+08	2.0E+10	7.9E+10	2.6E+12	8.37

† - Based on generator estimate provided in response to comments.

The upper limit activity concentration is assumed to be the 95^{th} percentile of the lognormal distribution. The geometric standard deviation of the lognormal distribution is calculated as:

$$GSD = e^{\frac{\ln(UL) - \ln(GM)}{1.65}}$$

where

GSD	=	geometric standard deviation (dimensionless)
UL	=	95^{th} percentile activity, Bq
GM	=	geometric mean, Bq

The ^{233}U geometric mean and 95^{th} percentile activity are based on estimates provided by the generator (NNSA/NFO 2017).

The INL Waste Associated with Unirradiated LWBR waste stream required a special analysis due to ^{229}Th, ^{230}Th, ^{232}U, ^{233}U, and ^{234}U exceeding their action levels. Disposal of the total waste stream inventory would cause large relative increases in the ^{229}Th, ^{232}U, ^{233}U, and ^{234}U SLB inventory (Table 2). The Area 5 RWMS SLB sum of fractions (SOFs) increases from 0.87 to 0.89 with addition of the waste stream activity.

Table 2. Expected Increase in the Disposed Inventory of Radionuclides Exceeding their Action Levels and the Area 5 RWMS SOFs at Closure (10/1/2028) (NSTec 2017)

Nuclide	FY 2016 SLB Disposed Geometric Mean Inventory	Geometric Mean INEL167203QR1_0 Inventory	Relative Percent Change
^{229}Th	6.0E+11 Bq	2.6E+13 Bq	4.3E+03
^{230}Th	3.7E+11 Bq	2.6E+10 Bq	7.0
^{232}U	2.1E+12 Bq	5.3E+13 Bq	2.5E+03
^{233}U	1.3E+14 Bq	2.7E+13 Bq	21
^{234}U	1.8E+14 Bq	4.0E+13 Bq	22
SLB SOFs	0.87	0.89	2.1

The INL Waste Associated with Unirradiated LWBR waste stream maximum activity occurs at closure when ^{232}U and its progeny are present (Figure 1). A second smaller peak in total activity occurs around 110,000 years as the progeny of ^{234}U approach secular equilibrium. The ^{229}Th activity reaches a peak at approximately 5,000 years. The maximum effect of the INL Waste Associated with the Unirradiated LWBR waste stream should occur within 120,000 years of closure.

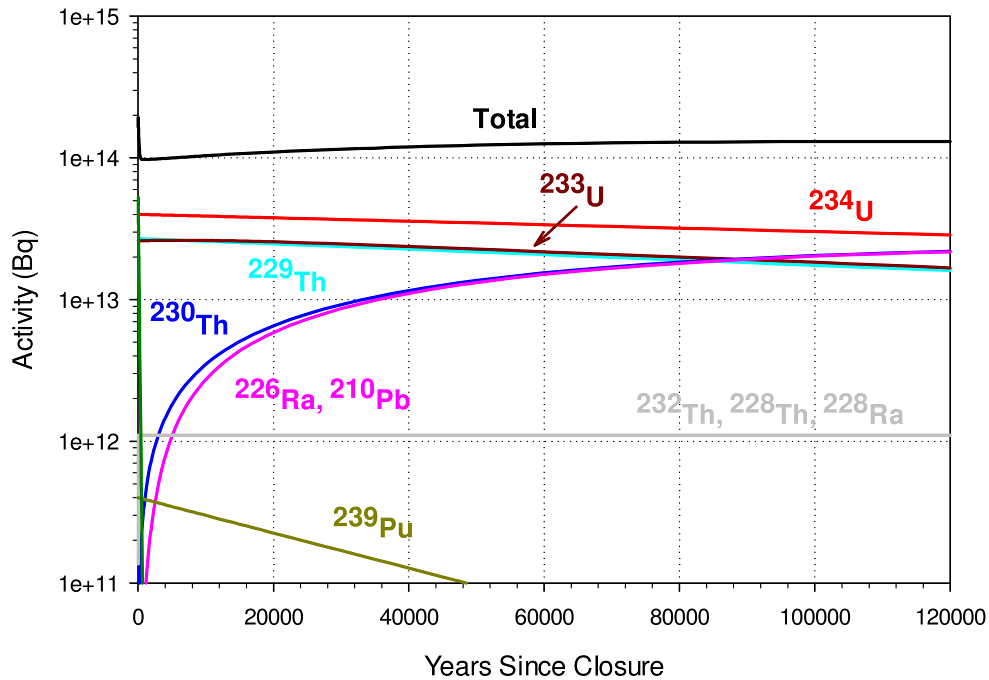

Figure 1. Activity Time Series of the INL Waste Associated with LWBR Waste Stream

3.2 Performance Assessment Modeling

The PA modeling adds the inventory of the INL Waste Associated with the Unirradiated LWBR waste stream to the A5 RWMS v 4.200 model and determines if there is a reasonable expectation of meeting the DOE Manual DOE M 435.1-1, "Radioactive Waste Management Manual," Chapter IV, Section P performance objectives (DOE 1999). The PA model evaluates the INL Waste Associated with the Unirradiated LWBR waste stream radionuclide activity added to the inventory of post-1988 SLB waste disposed through FY 2016. The SA inventory also includes the Pit 6, Pit 13, and post-1988 Greater Confinement Disposal borehole inventories. The model is run with a 2.5-meter (m) (8.2-foot [ft]) closure cover for SLB disposal units.

The mean and median model results are calculated using 5,000 Latin hypercube samples (LHS). A sample size of 5,000 provides stable estimates of the mean and 95th percentile results of the PA model (Bechtel Nevada [BN] 2006). A reasonable expectation of compliance with the performance objectives is assumed if the mean and median are less than the performance objectives for 1,000 years after closure. In every case, the mean was greater than the median. The SA only reports the mean results.

For comparison purposes, baseline results are obtained by running the model with the inventory disposed through FY 2016 and without the INL Waste Associated with the Unirradiated LWBR waste stream.

4.0 Results and Interpretation

4.1 Performance Assessment Results

4.1.1 Air Pathway Results

The air pathway annual total effective dose (TED) is evaluated for the resident exposure scenario using 5,000 LHS realizations. The resident exposure scenario estimates the dose to an adult residing in a home at the 100-meters (m) (330-feet [ft]) Area 5 RWMS boundary. A complete description of the exposure scenario can be found in the earlier PA documentation (BN 2006).

The annual TED is calculated for a period of 1,000 years after closure. The maximum mean and 95th percentile annual TED occur at 1,000 years and are both less than the 0.1 millisievert (mSv) limit (Table 3). Addition of the INL Waste Associated with the Unirradiated LWBR waste stream increases the maximum resident air pathway TED. Addition of the INL Waste Associated with Unirradiated LWBR waste stream increases the maximum resident air pathway TED approximately 47%. The increase is caused mostly by ^{229}Th+P, where "+P" indicates that the dose from short-lived progeny in equilibrium is included.

Table 3. Maximum Air Pathway Annual TED for a Resident at the Area 5 RWMS 100-m (330-ft) Site Boundary and the Waste Inventory Disposed through FY 2016

Scenario	Time of Maximum†	Mean (mSv)	95th Percentile (mSv)
Resident without INEL167203QR1_0 Waste Stream	1,000 y	1.7E-4	5.8E-4
Resident with INEL167203QR1_0 Waste Stream	1,000 y	2.5E-4	8.8E-4

† - years after closure

Addition of the INL Waste Associated with the Unirradiated LWBR waste stream increases the air pathways mean annual TED throughout the compliance period (Figure 2). The largest relative increase in the mean, approximately 48%, occurs at 750 years after closure.

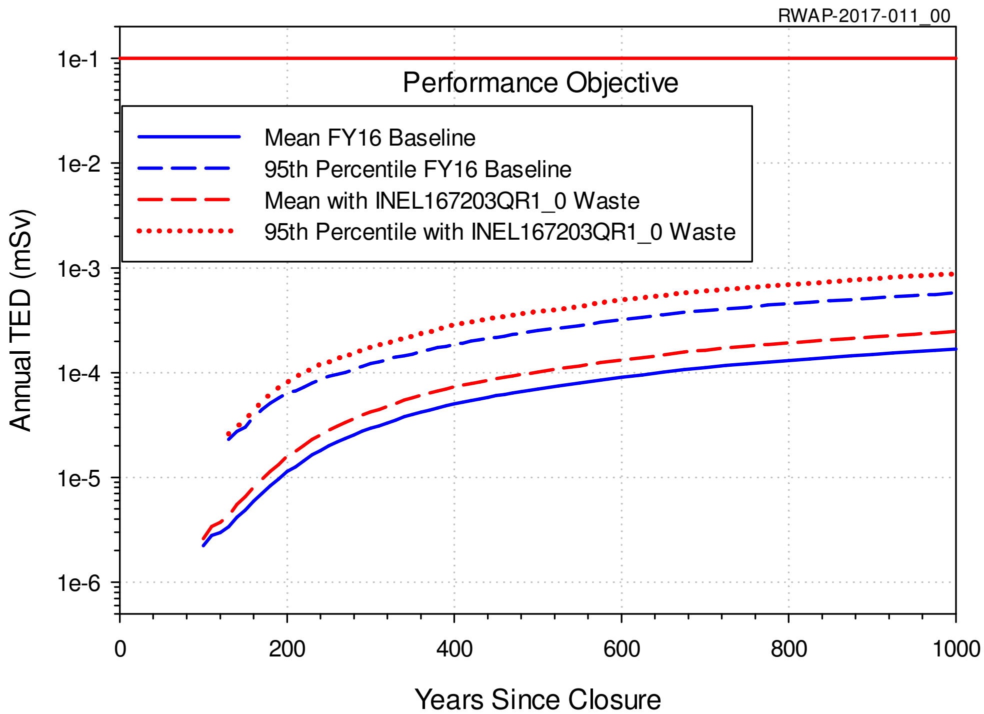

Figure 2. Air Pathway Annual TED Time History for a Resident at the 100-m (330-ft) Boundary with and without the INEL167203QR1_0 Waste Stream

4.1.1.1 Alternative Air Pathway Scenarios

Uncertainty contributed by the selected exposure scenario was evaluated by calculating the air pathway annual TED for alternative scenarios. The scenarios evaluated are the transient occupancy scenario, the resident with agriculture scenario, and open rangeland scenarios for a ranch at two plausible locations: one at the NNSS boundary closest to the Area 5 RWMS and another at Cane Spring. The scenarios and their assumptions are described in the PA (BN 2006).

The maximum mean and the 95th percentile TEDs are all less than the performance objective for all of the alternative scenarios (Table 4). Although the exposure scenario is a source of uncertainty, there is a high likelihood of compliance for a range of reasonable scenarios. Addition of the INL Waste Associated with the Unirradiated LWBR waste stream increases the maximum result for all alternative scenarios.

Table 4. Maximum Air Pathway Annual TEDs for Alternative Scenarios with the FY 2016 Inventory

Scenario	Inventory	Time of Maximum	Mean (mSv)	95th Percentile (mSv)
Transient Occupancy	FY 2016 Baseline Inventory	1,000 y	6.8E-5	2.4E-4
	FY 2016 with INEL167203QR1_0	1,000 y	1.0E-4	3.6E-4
Resident with Agriculture	FY 2016 Baseline Inventory	1,000 y	3.6E-4	1.3E-3
	FY 2016 with INEL167203QR1_0	1,000 y	5.3E-4	1.9E-3
Open Rangeland/Cane Spring	FY 2016 Baseline Inventory	1,000 y	5.7E-9	1.4E-8
	FY 2016 with INEL167203QR1_0	1,000 y	8.5E-9	2.1E-8
Open Rangeland/NNSS Boundary	FY 2016 Baseline Inventory	1,000 y	9.6E-8	2.3E-7
	FY 2016 with INEL167203QR1_0	1,000 y	1.4E-7	3.6E-7

4.1.1.2 Long-Term Air Pathway Performance

The inventory of the INL Waste Associated with Unirradiated LWBR is expected to increase beyond 1,000 years as ^{234}U progeny are produced by serial radioactive decay. The model duration was increased to 10,000 years to evaluate long-term performance. The air pathway dose from ^{229}Th+P, which is of particular concern for this waste stream, should occur within 10,000 years as the peak activity occurs at 5,000 years.

Over a 10,000-year period the maximum air pathway annual TED occurs at 10,000 years (Table 5). Addition of the INL Waste Associated with Unirradiated LWBR increases the maximum annual TED approximately 27%, but the mean and 95th percentile remain less than the performance objective.

Table 5. Maximum Air Pathway Annual TED over 10,000 years for a Resident at the Area 5 RWMS 100-m (330-ft) Site Boundary with the Waste Inventory Disposed through FY 2016

Scenario	Time of Maximum	Mean (mSv)	95th Percentile (mSv)
Resident without INEL167203QR1_0 Waste Stream	10,000 y	2.2E-3	7.8E-3
Resident with INEL167203QR1_0 Waste Stream	10,000 y	2.8E-3	9.8E-3

The INL Waste Associated with Unirradiated LWBR increases the air pathway annual TED throughout the 10,000-year period (Figure 3). The maximum relative increase of approximately 48% occurs at 750 years.

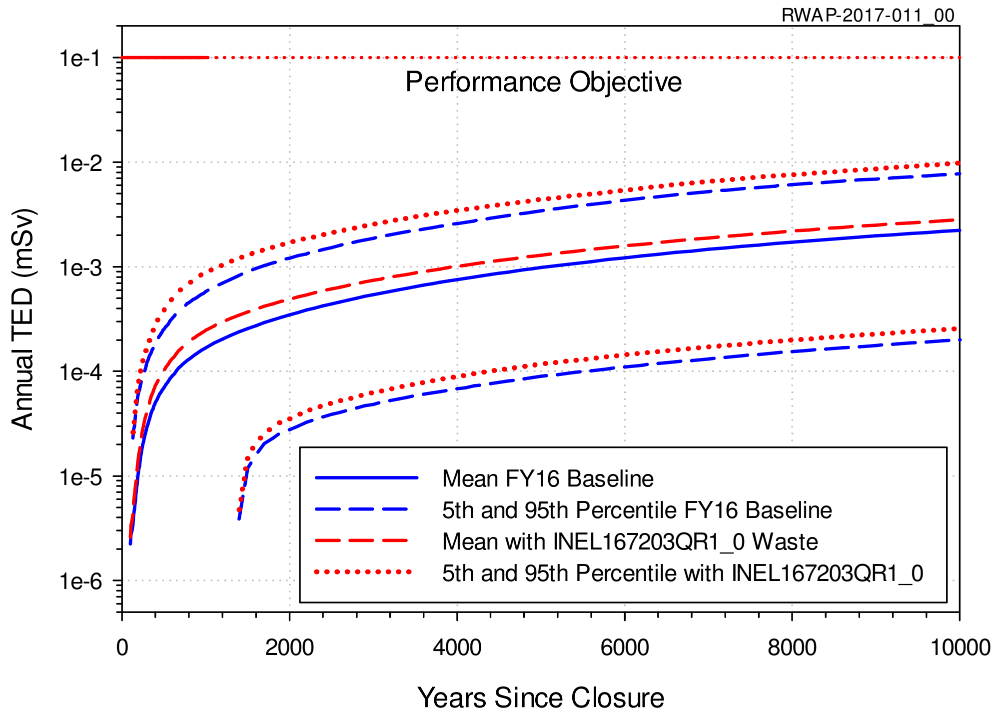

Figure 3. Air Pathway Annual TED 10,000-Year Time History for a Resident at the 100-m (330-ft) Boundary with and without the INEL167203QR1_0 Waste Stream

4.1.2 All-Pathways Results

The all-pathways annual TED is also calculated for the resident exposure scenario. The maximum mean and 95th percentile resident all-pathways annual TEDs are less than the 0.25 mSv limit (Table 6). Addition of the INL Waste Associated with Unirradiated LWBR waste stream increases the maximum resident all-pathways annual TED approximately 34%. The all-pathways annual TED increase is caused by ^{229}Th+P contributed by the INL Waste Associated with Unirradiated LWBR.

Table 6. Maximum All-Pathways Annual TED for a Resident at the Area 5 RWMS 100-m (330-ft) Site Boundary and the Waste Inventory Disposed through FY 2016

Scenario	Time of Maximum	Mean (mSv)	95th Percentile (mSv)
Resident without INEL167203QR1_0 Waste Stream	1,000 y	9.3E-4	2.6E-3
Resident with INEL167203QR1_0 Waste Stream	1,000 y	1.2E-3	3.7E-3

Addition of the INL Waste Associated with the Unirradiated LWBR waste stream increases the all-pathways annual TED throughout the compliance period (Figure 4). The largest relative increase in the mean, approximately 34%, occurs at 1,000 years after closure.

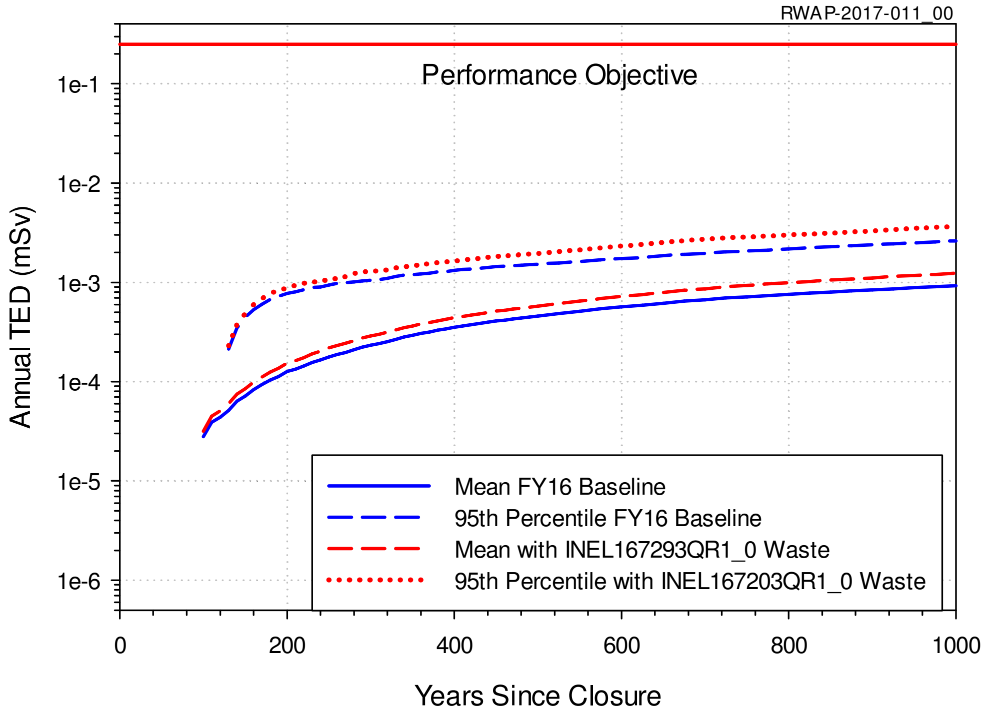

Figure 4. All-Pathways Annual TED Time History for a Resident at the 100-m (330-ft) Boundary with and without the INEL167203QR1_0 Waste Stream

4.1.2.1 Alternative All-Pathways Scenarios

Uncertainty contributed by the selected exposure scenarios was evaluated by calculating the all-pathways annual TED for alternative scenarios. The scenarios evaluated are the transient occupancy scenario, the resident with agriculture scenario, and open rangeland scenarios for a ranch with two plausible exposure locations: one at the NNSS boundary closest to the Area 5 RWMS and another at Cane Spring. The scenarios and their assumptions are described in the PA (BN 2006).

The mean and 95th percentile all-pathways annual TEDs are all less than the performance objective for all alternative scenarios (Table 7). Although the exposure scenario is a source of uncertainty, there is a high likelihood of compliance for a range of reasonable scenarios. Addition of the INL Waste Associated with the Unirradiated LWBR waste stream increases the maximum annual TED for the transient occupancy scenario only.

Table 7. Maximum All-Pathways Annual TEDs for Alternative Scenarios

Scenario	Inventory	Time of Maximum	Mean (mSv)	95th Percentile (mSv)
Transient Occupancy	FY 2016 Baseline Inventory	1,000 y	5.3E-3	1.3E-2
	FY 2016 with INEL167203QR1_0	1,000 y	6.2E-3	1.5E-2
Resident with Agriculture	FY 2016 Baseline Inventory	1,000 y	2.5E-2	7.9E-2
	FY 2016 with INEL167203QR1_0	1,000 y	2.5E-2	8.2E-2
Open Rangeland/Cane Spring	FY 2016 Baseline Inventory	1,000 y	4.3E-3	1.5E-2
	FY 2016 with INEL167203QR1_0	1,000 y	4.3E-3	1.5E-2
Open Rangeland/NNSS Boundary	FY 2016 Baseline Inventory	1,000 y	4.5E-3	1.6E-2
	FY 2016 with INEL167203QR1_0	1,000 y	4.5E-3	1.6E-2

4.1.2.2 Long-Term All-Pathways Performance

Over a 10,000-year period the maximum all-pathways annual TED occurs at 10,000 years (Table 8). Addition of the INL Waste Associated with Unirradiated LWBR increases the annual TED, but the mean and 95th percentile remain less than the performance objective.

Table 8. Maximum All-Pathways Annual TED over 10,000 years for a Resident at the Area 5 RWMS 100-m (330-ft) Site Boundary with the Waste Inventory Disposed through FY 2016

Scenario	Time of Maximum	Mean (mSv)	95th Percentile (mSv)
Resident without INEL167203QR1_0 Waste Stream	10,000 y	1.2E-2	3.5E-2
Resident with INEL167203QR1_0 Waste Stream	10,000 y	1.7E-2	5.2E-2

The INL Waste Associated with Unirradiated LWBR increases the all-pathways annual TED throughout the 10,000-year period (Figure 5). The maximum relative increase of approximately 39% occurs at 3,400 years.

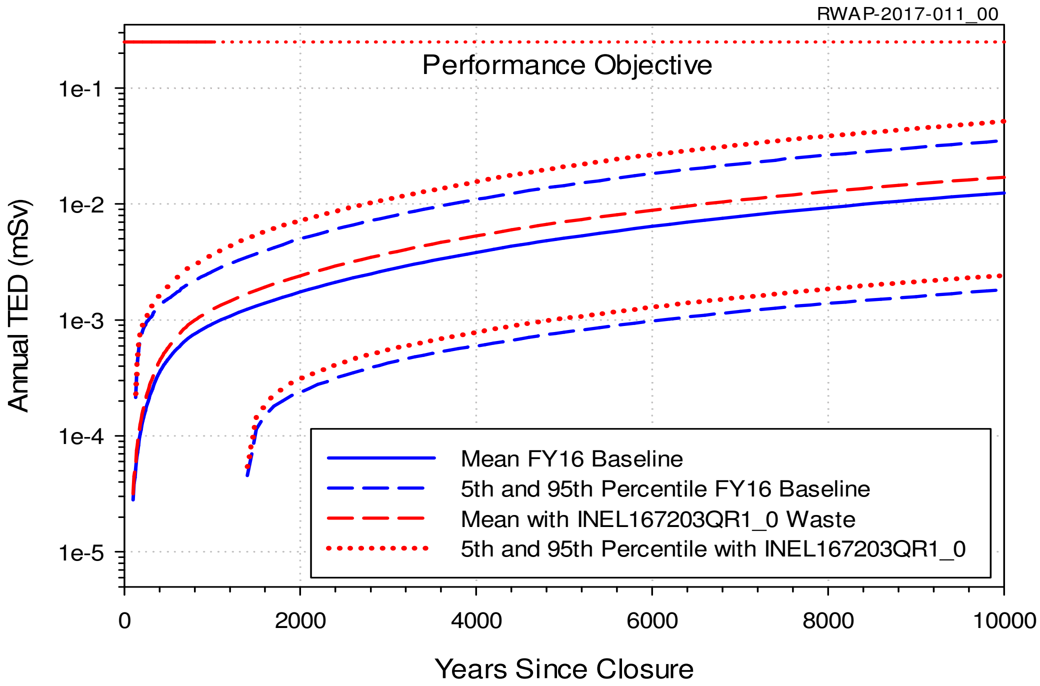

Figure 5. All Pathways Annual TED 10,000-Year Time History for a Resident at the 100-m (330-ft) Boundary with and without the INEL167203QR1_0 Waste Stream

The model duration was increased to 120,000 years to include peak doses from the INL Waste Associated with Unirradiated LWBR. Model results for such a long interval are considered highly uncertain as many model assumptions likely become invalid as time increases. The model was run deterministically to obtain the 120,000-year results.

The annual all-pathways TED with the INL Waste Associated with Unirradiated LWBR waste stream increases throughout the 120,000 year period with the maximum occurring at 120,000 (Figure 6). The maximum annual TED is less than the 0.25 mSv performance objective throughout the period.

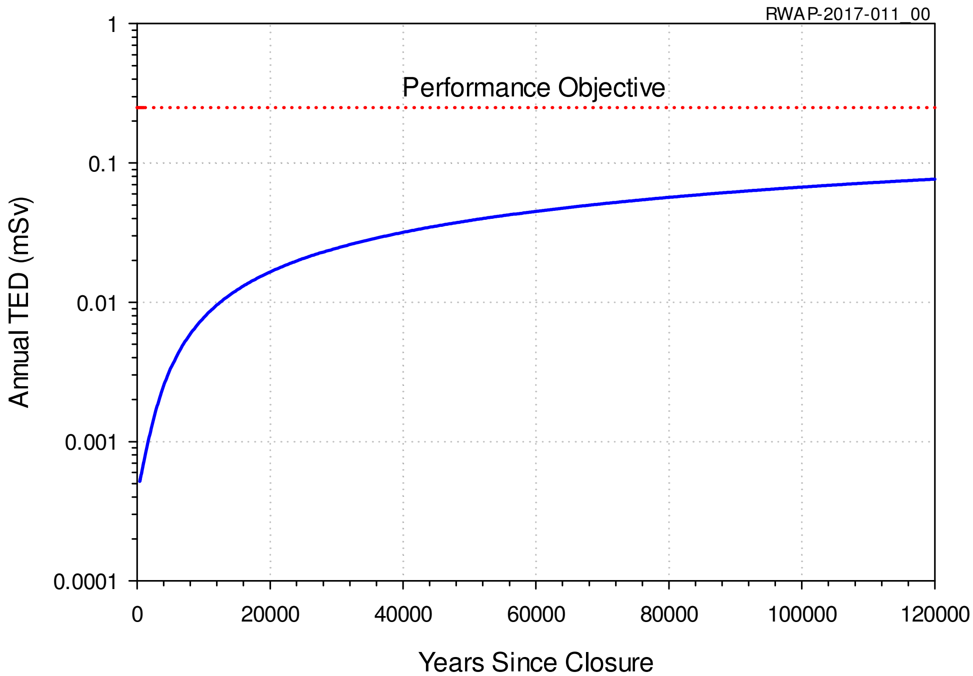

Figure 6. All-Pathways Annual TED 120,000 Year Time History for a Resident at the 100-m (330-ft) Boundary with and without the INEL167203QR1_0 Waste Stream

4.1.3 Intruder Results

Intruder results are evaluated for acute intruder scenarios only. NNSA/NFO institutional control policy is to maintain and enforce use restrictions (NNSA/NFO 2015). The proposed land-use restrictions are assumed to eliminate the possibility of chronic intrusion for 1,000 years.

The acute drilling scenario estimates the TED to a drill crew drilling a water well through a disposal unit. Exposure to contaminated drill cuttings occurs while augering a surface casing for the well. The acute construction scenario estimates the dose to construction workers building a residence on a disposal unit. Construction workers are exposed to waste exhumed from the construction excavation.

The maximum mean and 95th percentile acute intruder TEDs occur at 1,000 years and are less than the 5 mSv performance measure for both the drilling and construction acute intrusion scenarios (Table 9). Addition of the INL Waste Associated with Unirradiated LWBR waste stream increases the maximum acute intruder scenario results. The increases are caused by disposal of additional ^{229}Th+P in the INL Waste Associated with Unirradiated LWBR waste stream.

Table 9. Maximum TED for Acute Intrusion Scenarios at the Area 5 RWMS and the Waste Inventory Disposed through FY 2016

Scenario	Time of Maximum	Mean (mSv)	95th Percentile (mSv)
Drilling Intruder without INEL167203QR1_0	1,000 y	1.3E-3	2.3E-3
Drilling Intruder with INEL167203QR1_0	1,000 y	1.9E-3	3.1E-3
Construction Intruder without INEL167203QR1_0	1,000 y	1.0	1.7
Construction Intruder with INEL167203QR1_0	1,000 y	1.6	2.5

Addition of the INL Waste Associated with the Unirradiated LWBR waste stream increases the acute construction intruder TED throughout the compliance period (Figure 7). The maximum relative increase, approximately 68%, occurs at 290 years. The increase is due predominantly to ^{229}Th+P with a minor contribution from ^{228}Th+P, which is a progeny of ^{232}U.

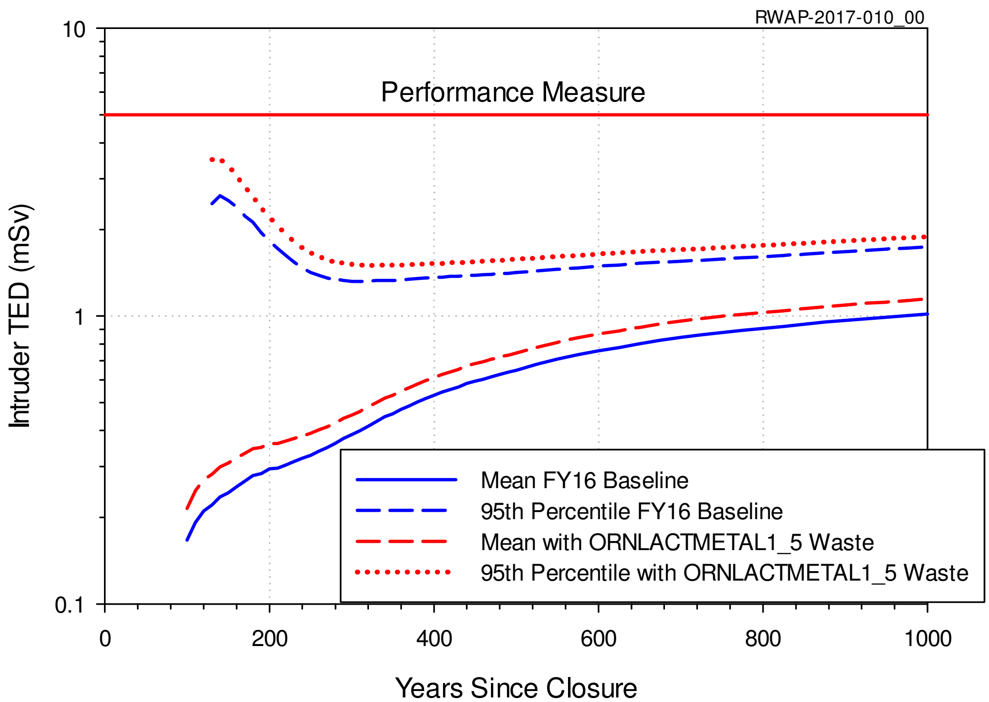

Figure 7. Acute Construction Intrusion Scenario TED Time History with and without the INEL167203QR1_0 Waste Stream

4.1.3.1 Long-Term Intruder Results

Over a 10,000-year period the maximum drilling and construction acute intruder TEDs occur at 10,000 years (Table 10). Addition of the INL Waste Associated with Unirradiated LWBR increases the intruder TED, but the mean and 95th percentile remain less than the performance measure.

Table 10. Maximum Intruder TED over 10,000 years at the Area 5 RWMS with the Waste Inventory Disposed through FY 2016

Scenario	Time of Maximum	Mean (mSv)	95th Percentile (mSv)
Drilling Intruder without INEL167203QR1_0	10,000 y	7.5E-3	1.4E-2
Drilling Intruder with INEL167203QR1_0	10,000 y	1.1E-2	2.2E-2
Construction Intruder without INEL167203QR1_0	10,000 y	2.8	5.7
Construction Intruder with INEL167203QR1_0	10,000 y	3.6	6.7

4.1.4 ^{222}Rn Flux Density Results

The radon-222 (^{222}Rn) flux density is averaged over the area of all post-1988 disposal units. The maximum mean and 95th percentile ^{222}Rn flux densities occur at 1,000 years and are less than the 0.74 becquerel per square meter per second (Bq m^{-2} s^{-1}) performance objective (Table 11). Addition of the INL Waste Associated with Unirradiated LWBR waste stream increased the maximum ^{222}Rn flux density approximately 13%. This waste stream does not require an increased depth of burial to attenuate ^{222}Rn flux

Table 11. Maximum ^{222}Rn Flux Density at the Area 5 RWMS and the Waste Inventory Disposed through FY 2016

Inventory	Time of Maximum	Mean (Bq m^{-2} s^{-1})	95th Percentile (Bq m^{-2} s^{-1})
FY 2016 Baseline Inventory	1,000 y	0.18	0.42
FY 2016 with INEL167203QR1_0	1,000 y	0.21	0.48

Addition of the INL Waste Associated with the Unirradiated LWBR waste stream increases the ^{222}Rn flux density throughout the compliance period (Figure 8). The maximum increase, 13%, occurs at 1,000 years.

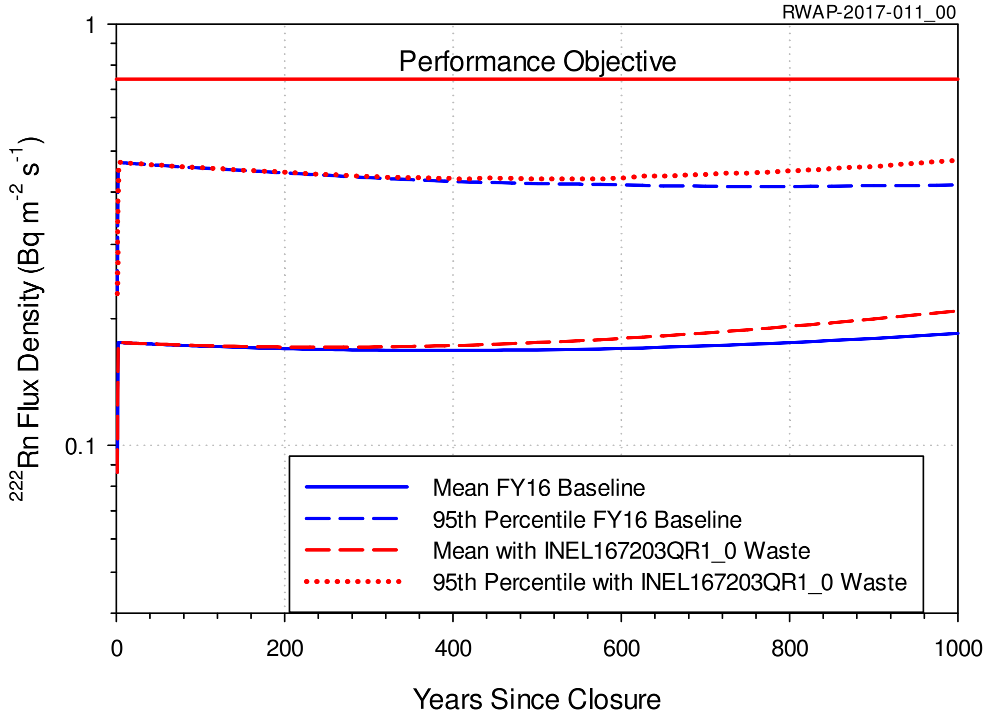

Figure 8. ^{222}Rn Flux Density Time History with and without the INEL167203QR1_0 Waste Stream

4.1.4.1 Long-Term Rn-222 Flux Density

Over a 10,000-year period, the maximum ^{222}Rn flux density occurs at 10,000 years (Table 12). The mean ^{222}Rn flux density without the INL Waste Associated with Unirradiated LWBR waste stream exceeds the performance objective by 5,000 years. Addition of the INL Waste Associated with Unirradiated LWBR waste stream caused the ^{222}Rn flux density to exceed the performance objective by 3,800 years.

Table 12. Maximum ^{222}Rn Flux Density over 10,000 Years at the Area 5 RWMS with the Waste Inventory Disposed through FY 2016

Scenario	Time of Maximum	Mean (Bq m^{-2} s^{-1})	95th Percentile (Bq m^{-2} s^{-1})
FY 2016 without INEL167203QR1_0 Waste Stream	10,000 y	1.8	3.8
FY 2016 with INEL167203QR1_0 Waste Stream	10,000 y	2.7	6.4

Addition of the INL Waste Associated with Unirradiated LWBR waste stream increased the ^{222}Rn flux density throughout the 10,000 years (Figure 9). The relative change increases over time as ^{234}U progeny are produced. The maximum increase, approximately 50%, occurs at 10,000 years.

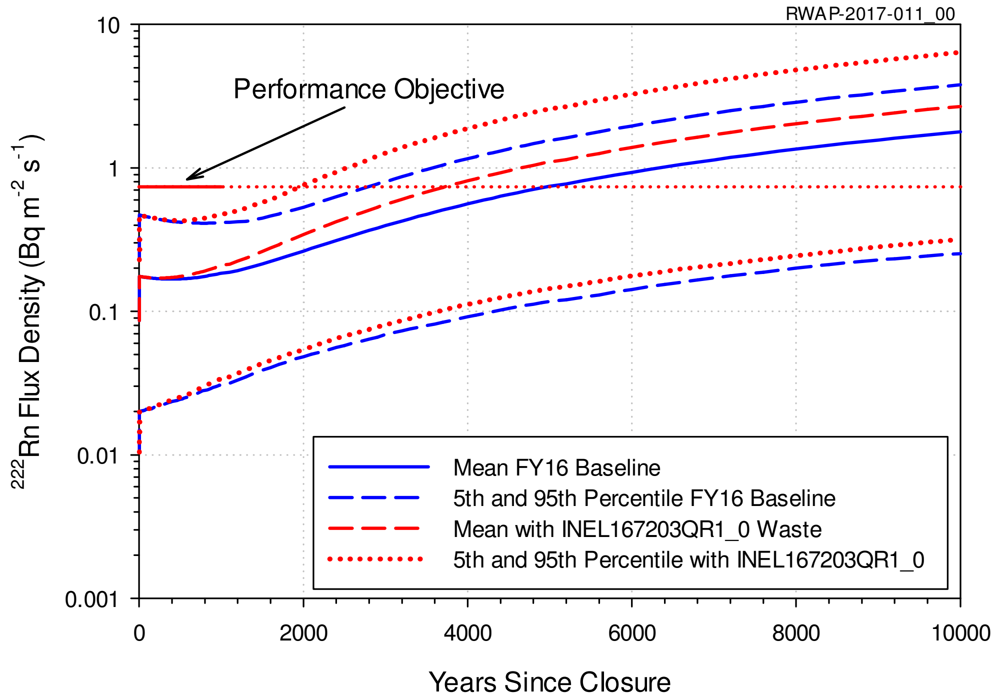

Figure 9. ^{222}Rn Flux Density 10,000 Year Time History Averaged Over All Disposal Units with and without the INEL167203QR1_0 Waste Stream

5.0 Conclusions

The effect of adding the INL Waste Associated with the Unirradiated LWBR waste stream inventory to the inventory of waste disposed through the end of FY 2016 was evaluated with the Area 5 RWMS v 4.200 PA model. The results indicate that all performance objectives can be met with disposal of the INL Waste Associated with the Unirradiated LWBR in an Area 5 RWMS SLB unit. Addition of the INL Waste Associated with the Unirradiated LWBR inventory increases most PA results. All maximum mean and 95th percentile results remain less than their respective performance objectives throughout the compliance period. No result exceeds the Low-Level Radioactive Waste Review Group notification criterion of exceeding 50% of a performance objective. The INL Waste Associated with the Unirradiated LWBR waste stream is acceptable for disposal with the condition that the total ^{233}U inventory be limited to 2.7E13 Bq (7.2E2 Ci).

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