G-CLC-A-00230
April 13, 2010

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OSR 45-24 (Rev 1-20-2009)

Calculation Cover Sheet

Project/Task	Calculation No	Project/Task No.
SRNL Waste Characterization	G-CLC-A-00230	N/A
Title: SRNL Non-Routine Waste Cuts (Hulls JCW and Canyon JCW) - Radioactive Waste Characterization Calculation	Functional Classification: General Service	Sheet 1 of 39
	Discipline: Waste Characterization	
Calculation Type: ☒ Type 1 ☐ Type 2	Type 1 Calc Status: ☐ Preliminary ☒ Confirmed	
Computer Program No: ☒ N/A	Version/Release No.: N/A	

Purpose and Objective

The purpose of this Engineering Calculation is to quantify the radiological activity for job control waste (JCW) from R&D activities related to spent fuel cladding hulls (four bags) [Ref. 1] and canyon operations (two bags) [Ref. 2]. This activity will be used for characterization of this combined waste cut (i.e., hulls JCW and canyon JCW) to allow for disposal in a low-level waste (LLW) container (e.g., B-25 or Sealand). The objective is to transfer the resulting waste container to SWM for disposal.

DC/RO **Date**

DOES NOT CONTAIN UNCLASSIFIED CONTROLLED NUCLEAR INFORMATION

Reviewing/Denying Official: C.A. Baptiste, Engineering and Regulatory Programs
(Name and organization)

Date: 12/21/2011

Summary of Conclusion

The activity attributed to the combined non-routine waste cut has been provided in Table 3 and should be used for input into WITS using the "00524" LLW stream. In addition, the total waste mass for this waste cut is 203 lb (92 kg) [see IA.5].

The total activity calculated for the non-routine waste cut, combined with routine "SRNLJCW" LLW that will primarily be used to fill the balance of the waste container, meets 1S WAC 3.17 requirements for disposal as LLW. The specific waste container chosen for this waste cut will be determined by the SRNL LLW GCO to allow for operational flexibility.

GCO Concurrence: Giampaolo Pungale Date: 4/9/10

Revisions

Rev #	Revision Description
0	Original Issue
N/A	N/A

Sign Off

Rev #	Originator (Print) Sign/Date	Verification/Checking Method	Verifier/Checker (Print) Sign/Date	Manager (Print) Sign/Date
0	Kerri C. Crawford 4/5/10 Kerri C. Crawford	☐ Design Check (GS/PS only) ☒ Document Review ☐ Qualification Testing ☐ Alternate Calculation ☐ Operational Testing	Antonio M. Deal 4-9-10	Mark D. Flake 4/13/10
N/A	N/A / N/A	☐ Design Check (GS/PS only) ☐ Document Review ☐ Qualification Testing ☐ Alternate Calculation ☐ Operational Testing	N/A / N/A	N/A / N/A

Additional Reviewer (Print): N/A	Signature: N/A	Date
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Release to Outside Agency (Print): N/A	Signature: N/A	Date

Security Classification of the Calculation: Unclassified

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Introduction

The purpose of this Engineering Calculation is to quantify the radiological activity for job control waste (JCW) from R&D activities related to spent fuel cladding hulls (four bags) [Ref. 1] and canyon operations (two bags) [Ref. 2]. This activity will be used for characterization of this combined waste cut (i.e., hulls JCW and canyon JCW) to allow for disposal in a low-level waste (LLW) container (e.g., B-25 or Sealand). The objective is to transfer the resulting waste container to SWM for disposal. The information submitted on the Radioactive Material Disposition Requests (RMDRs), as well as provided by assay files for these waste bags and other supporting documentation, was used to characterize this combined waste cut for disposal.

This calculation is comprised of the following sections:

- Inputs and Assumptions
- Analytical Methods and Computations
- Results
- Open Items
- Conclusion
- References
- Attachments

Inputs and Assumptions

The following input data and assumptions (IA) are used to perform this calculation:

IA.1. The hulls JCW was generated by R&D activities in 773-A Lab C-079 (see Attachment 1). The activity expected on the JCW originated from the spent fuel cladding hulls R&D activities, which is documented in Reference 3 and is used to determine the activity distribution. To quantify this activity, the waste bags were assayed (see Attachments 2 and 3).

IA.2. The canyon JCW was generated by R&D activities in 773-A Lab F-003 and C-134 (see Attachment 4).

IA.3. Per L7.13 Procedure 005 [Ref. 4], all waste cuts designated as “Canyon” waste are assayed to ensure they do not exceed the TRU waste threshold. The assay results for these waste bags are used to determine the TRU waste concentration (see Attachment 5).

IA.4. Per the SRNL Waste Certification Plan [Ref. 5], assay values reported as detection level values are not used to provide TRU concentration verification. Only detected TRU radionuclides are used to verify the TRU concentration for TRU waste.

IA.5. The mass for the combined waste cut is determined from the sum of the waste mass (i.e., “net weight”) provided by the assay results (see Attachments 2, 3, and 5).

IA.6. Low-Level Waste Acceptance Criteria (LLW WAC) are provided in 1S WAC 3.17 [Ref. 6]. LLW WAC compliance is demonstrated through input of test waste cuts into the Waste Information Tracking System (WITS) and the resulting calculations performed by WITS, as recommended by 1S WAC 3.17 [Ref. 6].

IA.7. The combined waste cut will be added to a waste container (e.g., 20-ft Sealand) filled with routine “SRNLJCW” LLW, which was characterized by G-CLC-A-00152 [Ref. 7].

IA.8. The activity assigned to the “SRNLJCW” waste cut in the shared waste container is 7.13 E -02 Ci [Ref. 7]. The minimum mass for a 20-ft Sealand filled with “SRNLJCW” LLW is 1,968 kg [Ref. 7]. The activity and minimum mass are used to demonstrate WAC compliance for this waste cut combined with “SRNLJCW” in a single Sealand. The actual “SRNLJCW” waste mass will be determined at the time that the container is closed and accepted by the GCO.

IA.9. If any other non-“SRNLJCW” waste cuts (i.e., “00524” LLW stream or other LLW stream cuts) are planned to be added to the Sealand that contains this combined waste cut, additional LLW WAC compliance tests may be performed to ensure overall container compliance. These waste cut additions would be made to allow for waste management operational efficiency. This calculation will not be revised since the total activity attributed to this waste cut will not be affected by these additions.

IA.10. To ensure the 778-A Waste Pad inventory remains below the Hazard Category 2 (HC2) threshold, the HC2 sum-of-fractions (SOF) contribution from this waste cut is calculated using the HC2 thresholds per DOE-STD-1027-92 [Ref. 8].

Analytical Methods and Computations

The following steps are used to perform this calculation. The equations used for each step (as applicable) are provided in the Results section below.

1. Determine the activity (Ci) per radionuclide for the hulls JCW based on process knowledge and assay data (see IA.1).
2. Determine the activity (Ci) per radionuclide for the canyon JCW based on process knowledge and assay data (see IA.2 – IA.4).
3. Determine the total activity (Ci) per radionuclide for the combined waste cut.
4. Determine compliance with LLW WAC [Ref. 6] for the combined waste cut within a waste container (e.g., 20-ft Sealand) containing routine "SRNL JCW" LLW [Ref. 7] (see IA.5 – IA.8).
5. Determine the HC2 SOF contribution for the combined waste cut (see IA.10).

Results

Activity Calculations – Hulls JCW

As indicated by IA.1, the activity attributed to the hulls JCW is based on a combination of process knowledge and assay results. Specifically, the radionuclides expected on this waste were Co-60, Sr-90, Cs-137, Pu-238, Pu-239/240, and Am-241 (Ref. 3). Of these radionuclides, Sr-90 can not be quantified using assay due to the lack of gamma emissions. However, based on the calculated activity ratio of Sr-90 to Cs-137 (using values reported in Reference 3), this radionuclide can be quantified by scaling to the reported Cs-137 activity. See Attachment 6 for this calculation.

For the radionuclides that can be measured by assay (e.g., Co-60, Pu-238), the measured value was compared to that expected from scaling to Cs-137 or Pu-239 based on the values reported in Reference 3. However, the actual reported assay value is used for further activity calculations. See Attachment 6 for this comparison.

It should be noted that due to the assay configuration and the size of the hulls JCW bags, the assay results are provided on two separate assay files. Specifically, bag 1 was added to routine canyon JCW that was being assayed; these results are provided in Attachment 2. Bags 2, 3, and 4 were added to other routine canyon JCW that was being assayed; these results are provided in Attachment 3. The canyon waste bags there were included in these assay runs are assumed, for the purposes of this calculation, to be included in the larger non-routine waste cut (i.e., more bounding). The assay results are combined for determining the activity attributed to the hulls JCW. See Attachment 6 for calculation of the combined assay results.

In addition to the process knowledge per Reference 3 and assay results per Attachments 2 and 3, the following other activities were calculated. See Attachment 6 for calculation of these activities.

- Daughter radionuclides per 1S WAC 2.02 [Ref. 9]
- I-129 scaled to Cs-137 per G-CLC-A-00152 scaling factor [Ref. 7]
- Plutonium isotopes scaled to Pu-239 per G-CLC-A-00089 scaling factors [Ref. 10]
- Uranium isotopes scaled to U-235 assuming EU at the minimum U-235 weight percent (i.e., 0.75%) [Ref. 11]

After all activities were calculated, the non-Performance Assessment (PA) nuclides that were less than 1Ci% were removed from further consideration, as allowed by 1S WAC 2.02 [Ref. 9]. This analysis resulted in the removal of the following nuclides: Co-60, Pu-242, U-236, U-238, Pa-234m, Th-231, and Th-234. The remaining activities are attributed to the hulls JCW and are provided in Table 1. See Attachment 6 for this calculation. Note that the values in Table 1 have been converted from nCi to Ci (i.e., 1 E +09 nCi per 1 Ci).

Table 1. Hulls JCW Nuclide Activities

Nuclide	Ci
Am-241	1.78 E -04
Ba-137m	9.30 E -04
Cs-137	9.83 E -04
I-129	5.57 E -10

Nuclide	Ci
Pu-238	9.67 E -04
Pu-239	3.45 E -03
Pu-240	7.72 E -04
Pu-241	8.10 E -03
Sr-90	5.64 E -04
U-234	4.24 E -06
U-235	2.91 E -07
Y-90	5.64 E -04
TOTAL	**1.65 E -02**

Activity Calculations – Canyon JCW

The canyon JCW was generated under the "Canyon" waste stream (see IA.2). As required by SRNL procedures, this JCW was assayed to determine the TRU concentration (see IA.3). The assay results for this JCW are provided in Attachment 5. The TRU concentration was calculated using Equation 1; these calculations are provided in Attachment 7.

$$TRU = \frac{\sum A_T}{M} \qquad \text{Equation (1)}$$

where TRU = TRU concentration (nCi/g)
A_T = Activity for TRU Isotope, T (nCi); see Attachment 5
M = Waste Mass (g), per assay results; see Attachment 5

As noted in IA.4, detection level values (i.e., not detected above the detection level; shown as "<" values) are not used to verify the TRU concentration. Per the assay results (see Attachment 5), Pu-238 and Pu-240 were reported as detection level values. If these detection level values are included, the TRU concentration is 126 nCi/g, which exceeds the allowable concentration for LLW. If these detection level values are not included, the TRU concentration is 96 nCi/g, which is below the verified concentration for TRU waste. Therefore, the canyon JCW, as assayed, was not acceptable as routine "SRNLJCW" LLW or as verified TRU waste.

To determine the activity attributed to the non-routine canyon JCW, only measured radionuclides (e.g., Cs-137a, where the "a" designates an actual value) were included (see Attachments 5 and 7). A comparison between these values and the activity that would be attributed to an equivalent volume of routine "SRNLJCW" LLW was used to determine the bounding activity attributed to this waste cut. For those radionuclides where the "SRNLJCW" LLW activity was bounding, no activity was attributed to the non-routine canyon JCW. For those radionuclides where the measured assay activity (including measured assay detection level values) was bounding, the assay activity was attributed to the non-routine canyon JCW. In addition, the plutonium isotopes (i.e., Pu-240, Pu-241 and Pu-242) were scaled to Pu-239 using the G-CLC-A-00089 scaling factors [Ref. 10]. Note that since Cs-137 and U-235 were not included as part of this waste cut, no daughter or other scaled nuclides calculations were performed for this waste cut. These calculations are provided in Attachment 7.

After all activities were calculated, the non-PA nuclides that were less than 1Ci% were removed from further consideration, as allowed by 1S WAC 2.02 [Ref. 9]. This analysis resulted in the removal of Pu-242. The remaining activities are attributed to the non-routine canyon JCW and are provided in Table 2. See Attachment 7 for this calculation.

Table 2. Canyon JCW Nuclide Activities

Nuclide	Ci
Am-241	3.60 E -05
Pu-238	7.94 E -05
Pu-239	4.15 E -04
Pu-240	9.30 E -05
Pu-241	9.75 E -04
TOTAL	**1.60 E -03**

Total Non-Routine Waste Cut Activity

The radionuclide activities and total activity were determined using Equations 2 and 3. The results of these calculations are provided in Table 3.

$$A_i = A_H + A_C \qquad \text{Equation (2)}$$

$$A = \sum A_i \qquad \text{Equation (3)}$$

where A_i = Total Activity for radionuclide, i (Ci)
A_H = Hulls JCW Activity for radionuclide, i (Ci); see Table 1
A_C = Canyon JCW Activity for radionuclide, i (Ci); see Table 2
A = Total Activity for combined non-routine waste cut (Ci)

Table 3. Non-Routine Waste Cut Nuclide and Total Activities

Nuclide	Ci
Am-241	2.14 E -04
Ba-137m	9.30 E -04
Cs-137	9.83 E -04
I-129	5.57 E -10
Pu-238	1.05 E -03
Pu-239	3.86 E -03
Pu-240	8.65 E -04
Pu-241	9.07 E -03
Sr-90	5.64 E -04
U-234	4.24 E -06
U-235	2.91 E -07
Y-90	5.64 E -04
TOTAL	**1.81 E -02**

Note that the TRU concentration for this combined waste cut, using Equation 1 and the total waste mass (i.e., 92 kg), is 65 nCi/g, which is acceptable for disposal as LLW.

LLW WAC Compliance

Per 1S WAC 3.17 [Ref. 6], the recommended method to demonstrate compliance with WAC requirements is to enter a test package into WITS (see IA.6). Therefore, a test package was created that contained two waste cuts: the "Non-Routine" waste cut and routine SRNL job control waste (JCW). The non-routine waste cut used the "00524" LLW stream, the nuclide activities shown in Table 3, and the assayed total waste cut mass (see IA.5); the routine waste cut used the "SRNLJCW" LLW stream (see IA.7), the total routine activity (see IA.8), and the minimum waste mass (see IA.8). The container used for this test package was a 20-ft Sealand (see IA.7 – IA.8). The WITS input as well as the results (i.e., limit checks) for this test package are provided in Attachments 8 and 9, respectively.

As seen by the limit checks in Attachment 9, a 20-ft Sealand that contains the non-routine waste cut along with routine SRNL JCW is acceptable for disposal in the Engineered Trench (ET). Other disposal locations may also be acceptable but were not specifically tested in WITS because the SWM operational preference is the ET. No PA isotope limits, TRU waste limits, or U-235 fissile gram equivalent (FGE) limits were exceeded.

A WITS test package is not included to demonstrate LLW WAC compliance for the non-routine waste cut as the sole waste cut within the Sealand. Due to the small size of this waste cut relative to the size of the Sealand, the remainder of the Sealand will be filled with waste from the routine LLW stream (i.e., "SRNLJCW").

HC2 SOF Contribution

The 778-A Waste Pad is designated as a Hazard Category 3 (HC3) Facility; therefore, the total radiological inventory on the 778-A Waste Pad can not exceed the Hazard Category 2 (HC2) threshold [Ref. 8]. Although the historical contribution from LLW to the HC2 SOF is known to be low compared to the contribution from TRU waste, the contribution of this non-routine LLW cut is checked to ensure it will not impact the current inventory control strategy for the 778-A Waste Pad. The following equation is used to calculate the HC2 SOF.

$$SOF = \sum \frac{A_i}{L_i} \qquad \text{Equation (4)}$$

where A_i = Activity for radionuclide, i (Ci); see Table 3
L_i = HC2 Activity Threshold Limit (Ci) for radionuclide, i [Ref. 8]
SOF = HC2 Sum of Fractions

These calculations are provided in Attachment 10 and indicate the HSC2 SOF for this waste cut is 0.0004. The HC2 SOF for the 778-A Waste Pad is not allowed to exceed a value of 1 to remain as a HC3 Facility [Ref. 8]. Due to the insignificant impact on HC2 SOF from this waste cut, its HC2 SOF contribution does not impact the inventory control strategy for the 778-A Waste Pad.

Open Items

There are no Open Items related to this calculation.

Conclusion

The activity attributed to the combined non-routine waste cut has been provided in Table 3 and should be used for input into WITS using the "00524" LLW stream. In addition, the total waste mass for this waste cut is 203 lb (92 kg) [see IA.5].

The total activity calculated for the non-routine waste cut, combined with routine "SRNLJCW" LLW that will primarily be used to fill the balance of the waste container, meets 1S WAC 3.17 requirements for disposal as LLW. The specific waste container chosen for this waste cut will be determined by the SRNL LLW GCO to allow for operational flexibility.

For the chosen disposal container, if additional characterized non-"SRNLJCW" waste cut(s) are placed into the same container for disposal, a WITS check should be performed prior to placing the additional cut(s) into the container to ensure no WAC limits are exceeded.

Lastly, this waste cut does not impact the HC3 inventory controls used for the 778-A Waste Pad.

References

1. Crawford, K. C., SRNL-L8300-2010-0008, "RMDR Disposition FY10-09 (Hulls JCW) – Preliminary", Revision 0, March 3, 2010.
2. Crawford, K. C., SRNL-L8300-2010-0009, "RMDR Disposition FY10-10 (Canyon JCW) – Preliminary", Revision 0, March 9, 2010.
3. T. S. Rudisill, "Decontamination of Zircaloy Cladding Hulls from Spent Nuclear Fuel", Journal of Nuclear Materials, 2008.
4. SRNL Manual L7.13, Procedure 005, "Quantifying, Manifesting, and Verifying Low-Level Radioactive Waste Packages", Revision 23, October 29, 2007.
5. Crawford, K. C., TSD-AEC-96-1114, "SRNL Waste Certification Plan", Revision 9, January 5, 2010.
6. SRS Manual 1S, WAC 3.17, "Low-Level Radioactive Waste Acceptance Criteria", Revision 11, January 15, 2009.
7. K. C. Crawford, "SRNL Routine Low-Level Waste Consolidation", G-CLC-A-00152, Revision 0, June 28, 2006.
8. US Department of Energy, "Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports", DOE-STD-1027-92, Change Notice No. 1, September 1997.

9. SRS Manual 1S, WAC 2.02, “Low Level, Hazardous, TRU, Mixed, and PCB Waste Characterization Requirements”, Revision 12, October 31, 2008.
10. K. C. Crawford, “SRNL Transuranic Waste Spreadsheets”, G-CLC-A-00089, Revision 4, December 29, 2009.
11. US Department of Commerce – National Bureau of Standards, "Standard Reference Materials: Uranium Isotopic Standard Reference Materials", April 1971.

Attachments

1. Hulls JCW RMDR, July 27, 2008
2. Assay Results #9796 – Rudisill Bag 1 + Canyon JCW
3. Assay Results #9843 – Rudisill Bags 2, 3, 4 + Canyon JCW
4. Canyon JCW RMDR, February 26, 2010
5. Assay Results #9865 – Canyon JCW
6. Hulls JCW Activity Calculations
7. Canyon JCW Activity Calculations
8. Non-Routine Waste Cut and Routine “SRNLJCW” (Minimum Mass) LLW Test Package – WITS Input
9. Non-Routine Waste Cut and Routine “SRNLJCW” (Minimum Mass) LLW Test Package – WITS Limit Checks
10. HC2 SOF Calculation

Attachment 1: Hulls JCW RMDR, July 27, 2008

Radioactive Material Disposition Request/ Potential Waste Characterization Changes

INSTRUCTIONS: Complete Section I for Radioactive Material Disposition Request and/or Section II for Potential Waste Characterization Changes, then submit your request to the GCO or CTF. E&WMG will document the disposition of the request separately.

Name: Tracy Rudisill Date: 7/27/08

Work Group: Activide Tec Phone No.: 5-2539 Pager: 15501

SECTION I – RADIOACTIVE MATERIAL DISPOSITION REQUEST

Description of Material:
Job Control Waste from studies using spent fuel Cladding Hulls

Type and condition material is in:

Location of material: F054 (originally from C079 ILC)

Quantity of material: 4 Bags

Any special handling concerns: None

Does this material pose any personal hazards? ☐ YES ☒ NO

If YES, please describe:

SECTION II – POTENTIAL WASTE CHARACTERIZATION CHANGES

Will an upcoming material and/or activity have the potential to change the existing solid radioactive waste characterization as described in the Waste Certification Plan? *For Example:* Will the activity involve handling different samples that are not normally used in the lab/area? ☐ YES ☒ NO
If YES, please describe the activity and the new samples/materials used:

NA

Attachment 2: Assay Results #9796 – Rudisill Bag 1 + Canyon JCW

Attachment 2, Page 1 of 7

Report for 12182009R-02 12/22/2009 3:12:55 AM Page 1

SRTC SWAF
NDA 2000 Assay Report

********** Sample Information **********

Sample ID:	12182009R-02		Count Sequence Number:	9796	
Operator:	SRSDOMAIN\W6091				
Assay Start:	12/18/2009 3:13:32 PM				
Description 1:	CANYON				
Description 2:					
Location:	F003, C-163, RUDISILL BAG 1				
Comment:					
Matrix Type:	Not Used				
Container Type:	55-Gallon Drum				
Weight:	Gross:	71.5 kg	Net:	49.2 kg	
Container:	Volume:	208.0 l	Full:	100.0 %	
Density:		0.240 kg /l			

Analysis Parameters

Channels:	4096	Conversion Gain:	4096
Energy Calibration:	12/7/09 5:04:54 PM		
Response Calibration:	7/8/09 3:39:38 PM		
Energy Tolerance:	1.00 keV		
Nuclide confid threshold:	0.30		

Nuclide Library:
C:\GENIE2K\CAMFILES\CANYON.NLB
Background File:
C:\Canberra\nda2k\Data\00009793_CNTR0001_DCAT0001_PROC000Y.CNF

Summed Non-Segmented Results

File Name:
C:\Canberra\nda2k\Data\00009796_CNTR0001_DCAT0001_PROC000Y.CNF

Background File:
C:\Canberra\nda2k\Data\00009793_CNTR0001_DCAT0001_PROC000Y.CNF

Acquisition Start: 12/18/2009 3:13:32 PM
Elapsed Live Time: 172800.00 sec Elapsed Real Time: 274740.07 sec

Attachment 2, Page 2 of 7

Report for: 12182009R-02 12/22/09 3:12:56 AM Page 2

Peak Analysis Report

Sample ID: 12182009R-02
Peak Analysis Performed on: 12/22/09 3:12:54 AM
Peak Analysis From Channel: 80
Peak Analysis To Channel: 4096

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
	1	147-	155	151.54	59.44	2.31E+006	23662.4	4.21E+007
	2	325-	334	330.37	123.07	1.65E+006	33360.4	7.85E+007
	3	342-	352	347.73	129.24	1.06E+005	36399.9	8.78E+007
	4	474-	485	480.10	176.35	4.28E+004	32065.4	8.53E+007
	5	508-	519	513.85	188.36	6.59E+005	33264.2	9.15E+007
	6	563-	574	568.99	207.98	2.40E+005	31488.2	8.22E+007
	7	679-	686	681.19	247.90	3.62E+005	18444.1	3.60E+007
	8	1143-	1153	1150.18	414.80	4.55E+004	17356.7	2.64E+007
	9	1180-	1191	1186.91	427.87	1.65E+005	18828.5	2.94E+007
	10	1280-	1293	1286.82	463.43	1.18E+005	22183.0	3.67E+007
	11	1310-	1323	1316.79	474.10	9.93E+005	21295.7	3.36E+007
	12	1616-	1627	1620.27	582.11	3.52E+004	8709.24	7.54E+006
	13	1643-	1654	1647.45	591.79	1.23E+005	8569.48	7.26E+006
M	14	1666-	1697	1672.30	600.63	9.42E+004	4641.06	7.65E+006
m	15	1666-	1697	1683.97	604.78	5.58E+004	4169.53	6.96E+006
m	16	1666-	1697	1689.76	606.85	3.48E+004	4060.05	7.49E+006
	17	1767-	1778	1771.55	635.96	5.06E+004	8032.59	6.41E+006
	18	1836-	1851	1843.86	661.70	5.90E+008	50075.0	1.22E+007
M	19	1927-	1945	1930.52	692.54	2.81E+004	1796.96	1.11E+006
m	20	1927-	1945	1937.86	695.16	4.11E+004	1900.72	1.25E+006
	21	2009-	2024	2016.96	723.31	4.15E+005	3872.97	1.11E+006
	22	2103-	2118	2111.05	756.80	9.08E+004	3427.06	9.46E+005
M	23	2167-	2196	2174.52	779.40	4.10E+003	1775.05	1.12E+006
m	24	2167-	2196	2188.41	784.34	6.11E+003	1914.35	1.17E+006
	25	2215-	2228	2220.78	795.87	3.76E+004	2999.28	8.01E+005
M	26	2272-	2300	2275.99	815.52	9.10E+003	1405.53	5.91E+005
m	27	2272-	2300	2292.62	821.44	7.15E+003	1379.91	7.38E+005
M	28	2352-	2380	2360.83	845.73	1.91E+004	1817.69	1.01E+006
m	29	2352-	2380	2373.36	850.19	9.31E+003	1636.22	9.62E+005
	30	2431-	2446	2438.10	873.23	2.17E+005	3130.03	7.42E+005
	31	2488-	2500	2492.92	892.75	9.97E+003	2389.44	5.38E+005
	32	2518-	2533	2525.03	904.18	1.89E+004	2770.72	6.32E+005
	33	2775-	2792	2783.87	996.33	1.76E+005	2651.86	4.86E+005
	34	2799-	2816	2807.70	1004.82	2.99E+005	2725.96	4.79E+005
	35	3102-	3117	3109.00	1112.10	5.13E+003	2041.94	3.45E+005
	36	3150-	3164	3155.40	1128.62	5.45E+003	1754.36	2.65E+005
	37	3186-	3198	3189.39	1140.72	2.87E+003	1412.40	1.88E+005

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	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
	38	3272-	3289	3281.00	1173.34	2.76E+006	3730.57	2.22E+005
M	39	3467-	3494	3472.16	1241.41	1.57E+003	404.67	6.39E+004
m	40	3467-	3494	3485.72	1246.24	1.18E+004	521.45	7.14E+004
	41	3556-	3574	3565.22	1274.55	4.93E+005	1718.76	8.45E+004
M	42	3677-	3710	3688.59	1318.48	2.54E+005	1299.07	1.06E+005
m	43	3677-	3710	3699.39	1322.33	5.88E+005	1769.91	9.66E+004
	44	3719-	3737	3728.24	1332.60	2.53E+006	3311.54	7.39E+004
	45	3816-	3829	3819.86	1365.23	8.04E+002	402.09	1.64E+004
	46	3933-	3949	3940.08	1408.04	3.20E+003	403.21	1.38E+004
M	47	4058-	4079	4063.68	1452.06	1.87E+003	158.19	5.22E+003
m	48	4058-	4079	4072.53	1455.21	2.37E+003	134.60	2.59E+003

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

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Report for: 12182009R-02 12/22/09 3:12:56 AM Page 4

Nuclide Peak Analysis Results

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (nCi)	Activity Uncertainty
H-3	0.000	??????????	??????		
C-14	0.000	??????????	??????		
CO-60a	0.998	1173.24*	99.90	3.48E+003	6.09E+001
		1332.50*	99.98	3.50E+003	7.34E+001
TC-99	0.000	??????????	??????		
I-129	0.000	??????????	??????		
BA-137m	0.000	??????????	??????		
CS-137a	1.000	661.65*	85.10	6.64E+005	1.40E+004
U-234	0.000	??????????	??????		
U-238	0.000	??????????	??????		
PU-239a	0.537	129.30*	0.01	8.16E+005	2.82E+005
		375.05	0.00		
		413.71	0.00		
AM-241a	0.998	59.54*	35.90	1.26E+005	1.15E+004
PU-241	0.000	??????????	??????		

Unidentified Peaks

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty
2	123.07	9.5361E+000	2.02
4	176.35	2.4745E-001	74.99
5	188.36	3.8130E+000	5.05
6	207.98	1.3881E+000	13.13
7	247.90	2.0962E+000	5.09
8	414.80	2.6302E-001	38.19
9	427.87	9.5705E-001	11.39
10	463.43	6.8007E-001	18.88
11	474.10	5.7484E+000	2.14
12	582.11	2.0387E-001	24.72
13	591.79	7.1394E-001	6.95
M 14	600.63	5.4520E-001	4.93
m 15	604.78	3.2295E-001	7.47
m 16	606.85	2.0140E-001	11.67
17	635.96	2.9265E-001	15.88
M 19	692.54	1.6288E-001	6.38
m 20	695.16	2.3798E-001	4.62
21	723.31	2.3995E+000	0.93
22	756.80	5.2554E-001	3.77
M 23	779.40	2.3701E-002	43.34
m 24	784.34	3.5345E-002	31.34
25	795.87	2.1737E-001	7.98

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M 26	815.52	5.2640E-002	15.45
m 27	821.44	4.1352E-002	19.31
M 28	845.73	1.1044E-001	9.52
m 29	850.19	5.3900E-002	17.57
30	873.23	1.2570E+000	1.44

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	Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty
	31	892.75	5.7673E-002	23.98
	32	904.18	1.0925E-001	14.68
	33	996.33	1.0195E+000	1.51
	34	1004.82	1.7309E+000	0.91
	35	1112.10	2.9710E-002	39.77
	36	1128.62	3.1540E-002	32.19
	37	1140.72	1.6621E-002	49.18
M	39	1241.41	9.0696E-003	25.82
m	40	1246.24	6.8126E-002	4.43
	41	1274.55	2.8542E+000	0.35
M	42	1318.48	1.4701E+000	0.51
m	43	1322.33	3.4023E+000	0.30
	45	1365.23	4.6525E-003	50.01
	46	1408.04	1.8529E-002	12.59
M	47	1452.06	1.0799E-002	8.48
m	48	1455.21	1.3689E-002	5.69

Errors quoted at: 2.00 sigma

E 0154
Cs 134
Sb-125

Attachment 2, Page 7 of 7

Report for: 12182009R-02 12/22/09 3:12:56 AM Page 7

NID Summary Results

Nuclide	Total Activity (nCi)	Concentration (nCi/g)
H-3	3.58E+004 +/- 7.53E+002	7.28E-001 +/- 1.53E-002
C-14	7.36E+002 +/- 2.54E+002	1.50E-002 +/- 5.17E-003
CO-60a	3.49E+003 +/- 4.69E+001	7.09E-002 +/- 9.53E-004
TC-99	1.66E+005 +/- 5.74E+004	3.37E+000 +/- 1.17E+000
I-129	3.00E-001 +/- 6.31E-003	6.10E-006 +/- 1.28E-007
BA-137m	6.28E+005 +/- 1.32E+004	1.28E+001 +/- 2.69E-001
CS-137a	6.64E+005 +/- 1.40E+004	1.35E+001 +/- 2.84E-001
U-234	5.78E+002 +/- 2.00E+002	1.17E-002 +/- 4.06E-003
U-235a	< 3.41E+001 +/- 1.16E+000	< 6.94E-004 +/- 2.36E-005
PU-238a	< 4.97E+005 +/- 3.40E+004	< 1.01E+001 +/- 6.92E-001
U-238	6.57E+002 +/- 2.27E+002	1.34E-002 +/- 4.61E-003
PU-239a	8.16E+005 +/- 2.82E+005	1.66E+001 +/- 5.73E+000
PU-240a	< 4.64E+005 +/- 3.16E+004	< 9.44E+000 +/- 6.42E-001
AM-241a	1.26E+005 +/- 1.15E+004	2.57E+000 +/- 2.34E-001
PU-241	3.57E+006 +/- 1.23E+006	7.25E+001 +/- 2.51E+001
PH-290a	< 0.00E+000 +/- 0.00E+000	< 0.00E+000 +/- 0.00E+000
Totals	6.01E+006	1.22E+002

Errors quoted at: 2.00 sigma

Symbols used:
* = Energy line found in the spectrum
M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
? = Nuclide is part of undetermined solution
X = Nuclide was rejected by interference analysis
@ = Nuclide has energy lines not used in weighed mean activity
< = MDA

Reviewed by: _____ Date: 2/10/10

38.71 nCi/g

Attachment 3: Assay Results #9843 – Rudisill Bags 2, 3, 4 + Canyon JCW

Attachment 3, Page 1 of 7

Report for 01192010R-01 1/20/2010 37:47 AM Page 1

SRT .F
NDA 2000 Report

**** ********** Sample I ation **********

Sample ID: 01192010R-01 unt Sequence Number: 9843
Operator: SRSDOMAIN\W6091
Assay Start: 1/19/2010 3:20 M
Description 1: CANYON
Description 2: CANYON + 3 RUDIS AGS (BAGS #2, #3, #4)
Location:
Comment:
Matrix Type: Not Used
Container Type: 55-Gallon Drum
Weight: Gross: 60.3 Net: 38.0 kg
Container: Volume: 208.0 Full: 100.0 %
Density: 0.1 g /l

Analysis meters

Channels: 4096 Conversion Gain: 4096
Energy Calibration: 12/7/09 54 PM
Response Calibration: 1/15/10 1 08 AM
Energy Tolerance: 1.00 ke
Nuclide confid threshold: 0.30
Nuclide Library:
C:\G IE2K\CAMFILES\CANYON.NLB
Background File:
C:\Canberra\nda2k\Data\00009839_CNT DCAT0001_PROC000Y.CNF

Summed Non-Segm Results

File Name:
C:\C nberra\nda2k\Data\00009843_CNT DCAT0001_PROC000Y.CNF

Background File:
C:\Canberra\nda2k\Data\00009839_CNT DCAT0001_PROC000Y.CNF

Acquisition Start: 1/19/2010 3:20:
Elapsed Live Time: 57600.00 sec psed Real Time: 70216.42 sec

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Peak Analy[illegible] Report

Sample ID: 0119201[illegible]
Peak Analysis Performed on: 1/20/10 [illegible] 37:46 AM
Peak Analysis From Channel: 80
Peak Analysis To Channel: 4096

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	Peak Area	Net Area Uncert.	Continuum Counts
		147-	155	151.54	59.44	[illegible]E+005	9153.52	6.29E+006
		223-	232	227.59	86.50	[illegible]E+003	10499.6	7.81E+006
		325-	335	330.31	123.04	[illegible]E+005	13738.8	1.23E+007
		343-	351	348.41	129.48	[illegible]E+004	11556.2	1.02E+007
		477-	485	480.01	176.31	[illegible]E+004	9670.88	9.28E+006
M	6	501-	516	504.83	185.14	[illegible]E+005	16770.8	1.66E+007
m		501-	516	510.29	187.09	[illegible]E+005	20097.8	1.78E+007
		563-	574	569.27	208.08	[illegible]E+004	12129.7	1.22E+007
		678-	686	681.15	247.89	[illegible]E+005	7817.74	6.00E+006
	1	708-	719	714.19	259.64	[illegible]E+004	9335.65	7.23E+006
	1	1143-	1155	1149.88	414.69	[illegible]E+004	7981.67	5.00E+006
	1	1180-	1191	1186.88	427.86	[illegible]E+004	7580.21	4.74E+006
	1	1280-	1293	1286.75	463.41	[illegible]E+004	9021.09	6.07E+006
	1	1311-	1324	1318.01	474.53	[illegible]E+005	8598.00	5.47E+006
	1	1414-	1427	1421.00	511.19	[illegible]E+004	6093.81	2.77E+006
	1	1577-	1591	1584.90	569.52	[illegible]E+003	4170.24	1.51E+006
	1	1614-	1627	1620.28	582.11	[illegible]E+004	3823.89	1.32E+006
	1	1642-	1654	1647.41	591.77	[illegible]E+004	3558.49	1.18E+006
M	1	1668-	1697	1672.29	600.63	[illegible]E+004	1730.73	8.78E+005
m	2	1668-	1697	1683.79	604.72	[illegible]E+004	1629.90	1.04E+006
m	2	1668-	1697	1689.37	606.71	[illegible]E+004	1513.07	1.03E+006
	2	1738-	1748	1741.45	625.25	[illegible]E+003	2931.64	8.98E+005
	2	1767-	1778	1771.55	635.96	[illegible]E+004	3120.09	9.60E+005
	2	1836-	1851	1843.75	661.66	[illegible]E+008	21107.2	1.39E+006
M	2	1924-	1945	1930.23	692.44	[illegible]E+004	748.51	1.87E+005
m	2	1924-	1945	1937.63	695.07	[illegible]E+004	696.77	1.81E+005
	2	1990-	2003	1995.55	715.69	[illegible]E+003	1365.61	1.68E+005
	2	2009-	2024	2016.86	723.28	[illegible]E+005	1765.06	1.89E+005
	2	2103-	2118	2110.94	756.77	[illegible]E+004	1530.97	1.80E+005
	3	2165-	2177	2172.43	778.66	[illegible]E+003	1250.83	1.48E+005
	3	2212-	2228	2220.68	795.83	[illegible]E+004	1581.43	1.92E+005
M	3	2271-	2300	2275.97	815.51	[illegible]E+003	736.59	1.67E+005
m	3	2271-	2300	2292.77	821.50	[illegible]E+003	805.77	2.00E+005
M	3	2352-	2382	2360.22	845.51	[illegible]E+003	775.74	1.79E+005
m	3	2352-	2382	2374.54	850.61	[illegible]E+003	665.11	1.93E+005
	3	2429-	2446	2438.02	873.20	[illegible]E+005	1763.15	2.05E+005
	3	2485-	2499	2493.34	892.90	[illegible]E+003	1409.55	1.71E+005

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	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	Peak Area	Net Area Uncert.	Continuum Counts
	3	2519-	2532	2524.81	904.10	E+003	1348.90	1.62E+005
	3	2775-	2792	2783.80	996.31	E+004	1585.48	1.67E+005
	4	2799-	2815	2807.60	1004.78	E+005	1592.74	1.55E+005
	4	3102-	3117	3109.21	1112.17	E+003	1218.56	1.22E+005
	4	3150-	3164	3155.96	1128.82	E+003	974.07	8.15E+004
	4	3186-	3198	3189.87	1140.89	E+002	813.83	6.25E+004
	4	3272-	3289	3280.92	1173.31	E+006	2881.04	7.53E+004
M	4	3468-	3494	3472.21	1241.43	E+002	209.44	1.52E+004
m	4	3468-	3494	3485.72	1246.24	E+003	287.31	1.80E+004
	4	3556-	3574	3565.13	1274.51	E+005	1099.30	1.99E+004
M	4	3676-	3709	3688.77	1318.55	E+004	412.80	2.40E+004
m	4	3676-	3709	3699.41	1322.33	E+004	548.40	2.32E+004
	5	3718-	3737	3728.12	1332.56	E+006	2638.18	2.21E+004
	5	3814-	3826	3820.24	1365.36	E+002	172.92	3.13E+003
	5	3933-	3949	3940.05	1408.03	E+003	185.96	2.66E+003
	5	3964-	3978	3968.99	1418.34	E+002	147.15	2.11E+003
M	5	4057-	4079	4062.28	1451.56	E+002	68.57	1.03E+003
m	5	4057-	4079	4073.05	1455.40	E+002	51.63	3.97E+002

M = First peak in a multiplet regior
m = ther peak in a multiplet regior
F = tted singlet

Erro s quoted at 2.000 sigma

Repo t for: 01192010R-01 1/20/ 7:47 AM Page 4

Nuclide Peak Analysis Results

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (nCi)	Activity Uncertainty
-3	0.000	??????????	????		
-14	0.000	??????????	????		
O-60a	0.999	1173.24*	99..	6.25E+003	1.14E+002
		1332.50*	99.9*	6.33E+003	1.60E+002
C-99	0.000	??????????	????		
-129	0.000	??????????	????		
A-137m	0.000	??????????	????		
S-137a	1.000	661.65*	85..	3.19E+005	6.35E+003
-234	0.000	??????????	????		
-235a	0.707	143.76	10..		
		185.71*	57.	2.57E+002	3.07E+001
-238	0.000	??????????	????		
J-239a	0.733	129.30*	0	2.10E+005	2.22E+005
		375.05	0.		
		413.71*	0.	2.63E+006	1.00E+006
M-241a	0.998	59.54*	35.	5.15E+004	3.96E+003
J-241	0.000	??????????	????		

Unidentified Peaks

Peak No.	Energy (keV)	Peak Counts per	Second	Peak CPS % Uncertainty
2	86.50	1.70	1	106.85
3	123.04	1.48	1	1.61
5	176.31	2.845	1	59.01
m 7	187.09	2.735	0	12.75
8	208.08	7.59	01	27.74
9	247.89	2.883	0	4.71
10	259.64	2.265	1	71.54
12	427.86	1.307	0	10.06
13	463.41	6.287	1	24.91
14	474.53	3.362	0	4.47
15	511.19	4.023	1	26.30
16	569.52	8.214	2	88.14
17	582.11	2.338	1	28.39
18	591.77	1.019	0	6.06
M 19	600.63	6.482	1	4.64
m 20	604.72	5.013	1	5.64
m 21	606.71	1.963	1	13.38
22	625.25	1.06	1	47.94
23	635.96	4.161	1	13.01
M 25	692.44	3.310	1	3.92

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Repo t for: 01192010R-01 1/20/1[illegible] :37:47 AM Page 5

m	26	695.07	2.502 [illegible] .01	4.83
	27	715.69	4.376 [illegible] 2	54.17
	28	723.28	3.651 [illegible] 0	0.84
	29	756.77	7.93[illegible] 1	3.35
	30	778.66	1.8[illegible] 2	119.87

Attachment 3, Page 6 of 7

Report for: 01192010R-01 1/20/. 37:47 AM Page 6

Peak No.	Energy (keV)	Peak Size Counts per Second	Peak CPS % Uncertainty
31	795.83	4.00 1	6.85
M 32	815.51	9.118 2	14.03
m 33	821.50	1.06 1	13.08
M 34	845.51	1.20 1	11.21
m 35	850.61	4.25 2	27.17
36	873.20	1.93 0	1.58
37	892.90	8.46 2	28.91
38	904.10	1.26 1	18.45
39	996.31	1.503 0	1.83
40	1004.78	2.60 0	1.06
41	1112.17	6.6 2	31.89
42	1128.82	4.1 2	41.19
43	1140.89	1.6 2	85.47
M 45	1241.43	1.2 2	29.09
m 46	1246.24	1.0 .	4.75
47	1274.51	4.24 0	0.45
M 48	1318.55	3.4 1	2.06
m 49	1322.33	7.7 1	1.22
51	1365.36	4.5 3	66.12
52	1408.03	2.51 2	12.86
53	1418.34	2.2 3	115.59
M 54	1451.56	5.484 3	21.70
m 55	1455.40	6.3 .	14.20

Errors quoted at: 2.00 sig

Attachment 3, Page 7 of 7

Repo t for: 01192010R-01 1/20/1 :37:47 AM Page 7

NID Sum sults

Nuclide	Total Activity (nC	Concentration (nCi/g)
-3	1.72E+004 +/- 3.42	4.53E-001 +/- 9.01E-003
-14	2.38E+003 +/- 9.2	6.25E-002 +/- 2.43E-002
)-60a	6.28E+003 +/- 9.2	1.65E-001 +/- 2.44E-003
-99	5.36E+005 +/- 2.0	1.41E+001 +/- 5.49E+000
129	1.44E-001 +/- 2.8	3.79E-006 +/- 7.55E-008
-137m	3.02E+005 +/- 6.0	7.94E+000 +/- 1.58E-001
S-137a	3.19E+005 +/- 6.3	8.40E+000 +/- 1.67E-001
234	1.87E+003 +/- 7.2	4.91E-002 +/- 1.91E-002
235a	2.57E+002 +/- 3.0	6.77E-003 +/- 8.09E-004
J-238a	< 4.70E+005 +/- 3.0	< 1.24E+001 +/- 7.95E-001
238	2.12E+003 +/- 8.2	5.58E-002 +/- 2.17E-002
-239a	2.63E+006 +/- 1.0	6.93E+001 +/- 2.70E+001
-240a	< 4.38E+005 +/- 2.8	< 1.15E+001 +/- 7.42E-001
AM-241a	5.15E+004 +/- 3.9	1.36E+000 +/- 1.04E-001
J-241	1.15E+007 +/- 4.4	3.03E+002 +/- 1.18E+002
-290a	< 0.00E+000 +/- 0.0	< 0.00E+000 +/- 0.00E+000
otals	1.54E+007	4.05E+002

Erro quoted at: 2.00 si

Sym ls used:
= Energy line found in the m
M = First peak in a multiplet
n = Other peak in a multiplet
= Fitted singlet
= Nuclide is part of undete solution
X = Nuclide was rejected by i ence analysis
= Nuclide has energy lines r d in weighed mean activity
= MDA

Revi ved by: _____ Date: 2/10/10

94.56

Attachment 4: Canyon JCW RMDR, February 26, 2010

Radioactive Material Disposition Request/ Potential Waste Characterization Changes

INSTRUCTIONS: Complete Section I for Radioactive Material Disposition Request and/or Section II for Potential Waste Characterization Changes, then submit your request to the GCO or CTF. E&WMG will document the disposition of the request separately.

Name: Susan Shouse /Kathy Clapp Date: 2/26/10

Work Group: ADS Phone No.: 5-4194 Pager: 15771

SECTION I – RADIOACTIVE MATERIAL DISPOSITION REQUEST

Description of Material: suspect TRU 3/1/10

2 Bags of suspect TRU (JCW) Waste

Canyon Support Waste Stream

Type and condition material is in: Job Control Waste, double bagged, good condition

Location of material: F003, C134

Quantity of material: one bag from each location

Any special handling concerns: Radiological PPE, gloves

Does this material pose any personal hazards? ☒ YES ☐ NO

If YES, please describe: Radiological <5 mrem/hr contact, ND WB

SECTION II – POTENTIAL WASTE CHARACTERIZATION CHANGES

Will an upcoming material and/or activity have the potential to change the existing solid radioactive waste characterization as described in the Waste Certification Plan? *For Example:* Will the activity involve handling different samples that are not normally used in the lab/area? ☐ YES ☐ NO

If YES, please describe the activity and the new samples/materials used:

Revision: 1/07
Reference: L1, Procedure 6.13

Attachment 5: Assay Results #9865 – Canyon JCW

Attachment 5, Page 1 of 4

Report for 02022010R-03 2/2/2010 1:19:33 PM 9748 Page 1

SRTC SWAF
NDA 2000 Assay Report

********** Sample Information **********

Sample ID: 02022010R-~~03~~ 4 Count Sequence Number: 9865
Operator: SRSDOMAIN\W6091
Assay Start: 2/2/2010 11:19:18 AM
Description 1: CANYON
Description 2:
Location:
Comment:
Matrix Type: Not Used
Container Type: 55-Gallon Drum
Weight: Gross: 27.0 kg Net: 4.7 kg
Container: Volume: 208.0 l Full: 100.0 %
Density: 0.020 kg /l

9748 46 44

Analysis Parameters

Channels: 4096 Conversion Gain: 4096
Energy Calibration: 12/7/09 5:04:54 PM
Response Calibration: 1/15/10 11:18:08 AM
Energy Tolerance: 1.00 keV
Nuclide confid threshold: 0.30
Nuclide Library:
C:\GENIE2K\CAMFILES\CANYON.NLB
Background File:
C:\Canberra\nda2k\Data\00009861_CNTR0001_DCAT0001_PROC000Y.CNF

Summed Non-Segmented Results

File Name:
C:\Canberra\nda2k\Data\00009865_CNTR0001_DCAT0001_PROC000Y.CNF

Background File:
C:\Canberra\nda2k\Data\00009861_CNTR0001_DCAT0001_PROC000Y.CNF

Acquisition Start: 2/2/2010 11:19:18 AM
Elapsed Live Time: 7200.00 sec Elapsed Real Time: 7210.58 sec

Jim, I have attached the original 10 min run with this one, just in case you needed additional info. Susan

Attachment 5, Page 2 of 4

Peak Analysis Report

Sample ID: 02022010R-03
Peak Analysis Performed on: 2/2/10 1:19:31 PM
Peak Analysis From Channel: 80
Peak Analysis To Channel: 4096

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
	1	147-	156	151.79	59.53	5.67E+004	589.74	8.75E+003
	2	223-	232	227.59	86.50	6.20E+002	287.44	5.68E+003
M	3	239-	266	244.59	92.55	9.85E+002	140.40	5.71E+003
m	4	239-	266	250.63	94.69	1.51E+003	149.81	5.90E+003
m	5	239-	266	261.42	98.53	3.51E+003	193.86	6.26E+003
	6	271-	278	273.88	102.97	1.02E+003	262.71	5.39E+003
	7	292-	301	297.14	111.24	1.15E+003	318.09	6.83E+003
	8	342-	352	347.79	129.27	2.80E+003	353.07	7.55E+003
	9	502-	511	506.53	185.75	7.10E+002	252.54	5.68E+003
M	10	551-	574	556.35	203.48	2.86E+002	106.63	4.51E+003
m	11	551-	574	569.39	208.12	5.18E+002	119.10	4.26E+003
	12	821-	833	827.84	300.09	5.36E+002	203.56	3.09E+003
	13	856-	866	860.95	311.87	2.95E+003	198.44	2.42E+003
	14	917-	925	919.87	332.84	1.60E+002	133.16	1.69E+003
M	15	934-	959	940.68	340.24	4.21E+002	94.63	2.44E+003
m	16	934-	959	953.50	344.81	2.85E+002	87.92	2.31E+003
	17	1032-	1044	1038.26	374.97	6.19E+002	164.23	1.93E+003
	18	1081-	1094	1088.01	392.68	2.66E+002	164.80	1.95E+003
	19	1142-	1153	1147.02	413.68	5.80E+002	144.96	1.55E+003
	20	1836-	1850	1843.50	661.57	2.11E+004	296.71	3.28E+002
	21	2132-	2145	2137.68	766.29	7.05E+001	45.28	1.61E+002
	22	2189-	2198	2193.86	786.28	3.11E+001	31.82	9.79E+001
	23	2359-	2369	2363.36	846.63	8.55E+001	35.55	9.55E+001
	24	2790-	2805	2796.76	1000.92	1.44E+002	43.52	1.10E+002
	25	3560-	3572	3563.72	1274.01	3.31E+001	26.49	6.09E+001
	26	3977-	3984	3980.35	1422.38	1.07E+001	12.55	1.53E+001

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment 5, Page 3 of 4

Report for: 02022010R-03 2/2/10 1:19:33 PM Page 3

Nuclide Peak Analysis Results

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (nCi)	Activity Uncertainty
H-3	0.000	??????????	??????		
C-14	0.000	??????????	??????		
TC-99	0.000	??????????	??????		
I-129	0.000	??????????	??????		
BA-137m	0.000	??????????	??????		
CS-137a	0.999	661.65*	85.10	3.84E+002	9.32E+000
U-234	0.000	??????????	??????		
U-235a	0.747	143.76	10.96		
		185.71*	57.20	6.94E+000	2.48E+000
U-238	0.000	??????????	??????		
PU-239a	1.000	129.30*	0.01	2.87E+005	3.80E+004
		375.05*	0.00	3.97E+005	1.06E+005
		413.71*	0.00	4.33E+005	1.09E+005
AM-241a	1.000	59.54*	35.90	3.60E+004	2.63E+003
PU-241	0.000	??????????	??????		

Unidentified Peaks

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty
2	86.50	8.6057E-002	46.39
M 3	92.55	1.3681E-001	14.25
m 4	94.69	2.1002E-001	9.91
m 5	98.53	4.8707E-001	5.53
6	102.97	1.4127E-001	25.83
7	111.24	1.5954E-001	27.69
M 10	203.48	3.9773E-002	37.23
m 11	208.12	7.1883E-002	23.01
12	300.09	7.4412E-002	37.99
13	311.87	4.0992E-001	6.72
14	332.84	2.2221E-002	83.23
M 15	340.24	5.8489E-002	22.47
m 16	344.81	3.9549E-002	30.88
18	392.68	3.6888E-002	62.05
21	766.29	9.7848E-003	64.27
22	786.28	4.3239E-003	102.22
23	846.63	1.1880E-002	41.56
24	1000.92	2.0055E-002	30.14
25	1274.01	4.6017E-003	79.94
26	1422.38	1.4850E-003	117.37

Errors quoted at: 2.00 sigma

Attachment 5, Page 4 of 4

Report for: 02022010R-03 2/2/10 1:19:34 PM Page 5

NID Summary Results

Nuclide	Total Activity (nCi)	Concentration (nCi/g)
H-3	2.07E+001 +/- 5.03E-001	4.41E-003 +/- 1.07E-004
C-14	3.75E+002 +/- 6.85E+001	7.97E-002 +/- 1.46E-002
CO-60a	< 1.28E+000 +/- 3.66E-002	< 2.73E-004 +/- 7.79E-006
TC-99	8.44E+004 +/- 1.54E+004	1.80E+001 +/- 3.29E+000
I-129	1.74E-004 +/- 4.21E-006	3.69E-008 +/- 8.96E-010
BA-137m	3.64E+002 +/- 8.82E+000	7.74E-002 +/- 1.88E-003
CS-137a	3.84E+002 +/- 9.32E+000	8.18E-002 +/- 1.98E-003
U-234	2.94E+002 +/- 5.38E+001	6.26E-002 +/- 1.14E-002
U-235a	6.94E+000 +/- 2.48E+000	1.48E-003 +/- 5.28E-004
PU-238a	< 7.94E+004 +/- 4.56E+003	< 1.69E+001 +/- 9.69E-001
U-238	3.34E+002 +/- 6.11E+001	7.11E-002 +/- 1.30E-002
PU-239a	4.15E+005 +/- 7.59E+004	8.83E+001 +/- 1.61E+001
PU-240a	< 6.36E+004 +/- 3.68E+003	< 1.35E+001 +/- 7.83E-001
AM-241a	3.60E+004 +/- 2.63E+003	7.65E+000 +/- 5.60E-001
PU-241	1.81E+006 +/- 3.32E+005	3.86E+002 +/- 7.07E+001
PH-290a	< 0.00E+000 +/- 0.00E+000	< 0.00E+000 +/- 0.00E+000
Totals	2.35E+006	5.00E+002

Errors quoted at: 2.00 sigma

Symbols used:
- * = Energy line found in the spectrum
- M = First peak in a multiplet region
- m = Other peak in a multiplet region
- F = Fitted singlet
- ? = Nuclide is part of undetermined solution
- X = Nuclide was rejected by interference analysis
- @ = Nuclide has energy lines not used in weighed mean activity
- < = MDA

Reviewed by: _____ Date: 3/9/10

Am & Pu (95 nCi/g)

Note: Page 4 of the assay file contained no information and therefore is not reproduced above.

Attachment 6: Hulls JCW Activity Calculations

A. Process Knowledge

Nuclide	Ave Conc (Ref. 3)	Units	Scalor Nuclide	Scalor Ratio (Ci%)
Co-60	518	GBq/m^3	Cs-137	0.76%
Sr-90	38900	GBq/m^3	Cs-137	57.37%
Cs-137	67800	GBq/m^3	Cs-137	100%
Pu-238	989	kBq/g	Pu-239	277.81%
Pu-239/240	356	kBq/g	Pu-239	100%
Am-241	161	kBq/g	Pu-239	45.22%

B. Assay Results – Summary

Assay File	9843	9796	N/A	
Description	Canyon Waste + Rudisill 2, 3,4	Canyon Waste + Rudisill 1	Total: Canyon + Rudisill 1, 2, 3, 4	
Waste Mass (kg)	38.0	49.2	87.2	
Nuclide	**nCi**	**nCi**	**nCi**	**Notes**
Co-60	6.28E+03	3.49E+03	9.77E+03	No DL
Cs-137	3.19E+05	6.64E+05	9.83E+05	No DL
U-235	2.57E+02	< 3.41E+01	2.91E+02	1 DL
Pu-238	< 4.70E+05	< 4.97E+05	9.67E+05	Both DL
Pu-239	2.63E+06	8.16E+05	3.45E+06	No DL
Pu-240	< 4.38E+05	< 4.64E+05	9.02E+05	Both DL
Am-241	5.15E+04	1.26E+05	1.78E+05	No DL
TOTAL	**3.92E+06**	**2.57E+06**	**6.49E+06**	
TOTAL (w/o DL)	**3.01E+06**	**1.61E+06**	**4.62E+06**	
TRU nCi/g	**94.5**	**38.7**	**63.0**	
TRU nCi/g (w/o DL)	**70.6**	**19.1**	**41.6**	

Notes:

1. The above table shows measured nuclides only. No scaled nuclides are included; see assay files in Attachments 2 and 3 for scaled and measured nuclides.
2. Detection Level (DL) values are shown as "<" values.
3. TRU concentration (nCi/g) is calculated using the TRU nuclides (i.e., Pu-238, Pu-239, Pu-240, and Am-241) and waste mass, per Equation 1.

Attachment 6, Page 2 of 2

C. Calculated Nuclides and Final Activities

PK Nuclide	Scalor Nuclide	Scalor Ratio (Ci%)	Calculated nCi	Total Assay Value (nCi)	Comparison	Selected nCi	Ci%	Final nCi
Co-60	Cs-137	0.76%	7.51E+03	9.77E+03	Assay Higher	9.77E+03	0.059%	0.00E+00
Sr-90	Cs-137	57.37%	5.64E+05		Assay Not Available	5.64E+05	3.41%	5.64E+05
Cs-137	Cs-137	100%	9.83E+05	9.83E+05	Assay Value Used	9.83E+05	5.95%	9.83E+05
Pu-238	Pu-239	277.81%	9.57E+06	9.67E+05	Assay DL Lower	9.67E+05	5.85%	9.67E+05
Pu-239/240	Pu-239	100%	3.45E+06	3.45E+06	Assay Value Used	3.45E+06	20.84%	3.45E+06
Am-241	Pu-239	45.22%	1.56E+06	1.78E+05	Assay Lower	1.78E+05	1.07%	1.78E+05
Other Measured Assay Isotopes (see above)								
U-235				2.91E+02	No PK value	2.91E+02	0.0018%	2.91E+02
I-129 scaled to Cs-137 (Ref. 7)								
I-129	Cs-137	0.0000567%	5.57E-01		Assay Not Available	5.57E-01	0.0000034%	5.57E-01
Plutonium Isotopes scaled to Pu-239 (Ref. 10)								
Pu-240	Pu-239	22.4%	7.72E+05	9.02E+05	Assay DL Higher – Used Scaled	7.72E+05	4.67%	7.72E+05
Pu-241	Pu-239	235%	8.10E+06		Assay Not Available	8.10E+06	48.98%	8.10E+06
Pu-242	Pu-239	0.00177%	6.10E+01		Assay Not Available	6.10E+01	0.00037%	0.00E+00
Uranium Isotopes scaled to U-235 (Ref. 11)								
U-234	U-235	1458%	4.24E+03		Assay Not Available	4.24E+03	0.026%	4.24E+03
U-236	U-235	22.8%	6.64E+01		Assay Not Available	6.64E+01	0.00040%	0.00E+00
U-238	U-235	2054%	5.98E+03		Assay Not Available	5.98E+03	0.036%	0.00E+00
Daughter Nuclides (Ref. 9)								
Ba-137m	Cs-137	94.60%	9.30E+05		Assay Not Available	9.30E+05	5.62%	9.30E+05
Y-90	Sr-90	100.00%	5.64E+05		Assay Not Available	5.64E+05	3.41%	5.64E+05
Pa-234m	U-238	100.00%	5.98E+03		Assay Not Available	5.98E+03	0.036%	0.00E+00
Th-234	U-238	100.00%	5.98E+03		Assay Not Available	5.98E+03	0.036%	0.00E+00
Th-231	U-235	100.00%	2.91E+02		Assay Not Available	2.91E+02	0.0018%	0.00E+00
TOTAL						**1.65E+07**	**100%**	**1.65E+07**

Attachment 7: Canyon JCW Activity Calculations

A. Assay Results – Summary

Assay File	9865
Description	Canyon
Waste Mass (kg)	4.7
Nuclide	**nCi**
Co-60	< 1.28E+00
Cs-137	3.84E+02
U-235	6.94E+00
Pu-238	< 7.94E+04
Pu-239	4.15E+05
Pu-240	< 6.36E+04
Am-241	3.60E+04
TOTAL	**5.94E+05**
TOTAL (w/o DL)	**4.51E+05**
TRU nCi/g	**126.4**
TRU nCi/g (w/o DL)	**96.0**

Notes:

1. The above table shows measured nuclides only. No scaled nuclides are included; see assay file in Attachment 5 for scaled and measured nuclides.
2. Detection Level (DL) values are shown as "<" values.
3. TRU concentration (nCi/g) is calculated using the TRU nuclides (i.e., Pu-238, Pu-239, Pu-240, and Am-241) and waste mass, per Equation 1.

B. Calculated Nuclides and Final Activities

Nuclide	**Ci**	**SRNLJCW 55-gal drum (Ci) [Ref. 7]**	**Comparison**	**Revised Ci**	**Ci%**	**Final Ci**
Co-60	1.28E-09	0	Same (DL vs. 0) – Use SRNLJCW			
Cs-137	3.84E-07	7.02E-05	SRNLJCW 2 OM Higher – Use SRNLJCW			
U-235	6.94E-09	7.20E-09	Same OM – Use SRNLJCW			
Pu-238	7.94E-05	2.24E-05	Assay DL same OM – Use Assay DL	7.94E-05	4.97%	7.94E-05
Pu-239	4.15E-04	3.67E-05	Assay 1 OM Higher – Use Assay	4.15E-04	25.96%	4.15E-04
Pu-240	6.36E-05	0	Same (DL vs. 0) – Scale to Pu-239 Assay [Ref. 10]	9.30E-05	5.82%	9.30E-05
Am-241	3.60E-05	4.34E-05	Same OM – Use Assay	3.60E-05	2.25%	3.60E-05
Pu-241		1.30E-04	Scale to Pu-239 Assay [Ref. 10]	9.75E-04	61.01%	9.75E-04
Pu-242		0	Scale to Pu-239 Assay [Ref. 10]	7.35E-09	0.00046%	0.00E+00
TOTAL				**1.60E-03**	**100%**	**1.60E-03**

Notes:

1. Assay values (nCi) shown in Table A above are converted to Ci values in Table B (i.e., 1 E +09 nCi per 1 Ci).
2. The "SRNLJCW 55-gal drum (Ci)" column represents the quantity expected of each assayed isotope based on Reference 7. Non-assay isotopes in the SRNLJCW LLW stream are not shown above.
3. Although the Am-241 assay value is the same order of magnitude (OM) as the "SRNLJCW" value, it is included to provide a more bounding TRU concentration calculation.

Attachment 8: Non-Routine Waste Cut and Routine "SRNLJCW" (Minimum Mass) LLW Test Package – WITS Input

Attachment 8, Page 1 of 3

3/30/2010 7:51:50 AM

Waste Package Data Report

For: **RUDISILL**

Username: L0482 **Date/Time:** 3/30/2010 7:50:32 AM

This package is tracked in WITS as: **LLW** **(Note: Some TRU waste at EATRU is tracked in WITS as LLW)**

The TRU isotope concentration is low enough to classify this as Low Level Waste.

General Info:

Package Activity (ci)	Certification Date	Parent Container
8.9405E-02		

Dose Rate (mrlhr)	Limit Deviation Number

Weight Info:

Gross Weight (kg)	Gross Weight (lb)
4,718.05	10,401.52

Waste Weight (kg)	Waste Weight (lb)
2,060.00	4,541.52

Generator Limit Check Facility	Generator Limit Check Location
EAV	ETRENCH2

Container Info:

Container Type Code	Description
468	SEA LAND CONTAINER - 20 FT

Pkg Tare Weight (kg)	Pkg Tare Weight (lb)	Container Type Tare Weight (kg)	Container Type Tare Weight (lb)
2,658.05	5,860.00	2,658.05	5,860.00

Cntnr Vol (m3)	Cntnr Vol (ft3)	Volume % Full	Waste Vol (m3)
33.2158	1,173.0000	100.00	33.2158

Shipment History:

Shipment ID	Date Shipped	Date Received	Sender	Receiver

Fissile Gram Equivalent (U235):	*TRU Isotope Conc. (nci/g):*	*LLW Pu239 Equivalent Activity (ci) (PEC):*
9.1689E-01	1.0847E+01	2.5438E-02

These calculations based on LLW Program definitions.

Fissile Gram Equivalent (Pu239):
5.8016E-01

TRU Alpha Act (ci):
2.2344E-02

Heat Load:	
3.0724E-03	*(BTU/Hr)*
9.0042E-04	*(Watts)*

TRU Pu239 Equivalent Activity (ci) (PEC):	*Pu239 Dose Equivalent Curies (DEC):*
2.3978E-02	2.2807E-02

These calculations based on TRU Program definitions.

Waste Streams:

Stream ID	Version	Description
00524-LLW	2	ROUTINE WASTE FROM SRTC LABS
SRNLJCW-LLW	0	ROUTINE LAB WORK AND OPS

Current Owner:

773-A SRNL

Current Location:* **(of overpack, if applicable)*

Facility	Location	Unit
SRNL		
X:	Y:	Z:

Nuclide Contents:

Nuclide			Activity (ci)
AM	241		7.086570E-03
AM	243		2.901593E-05
BA	137	M	1.148125E-02
C	14		1.154934E-05
CM	244		2.723363E-03
CS	137		1.210459E-02

Inside Packages:

IP Count: 0

Page 1 of 3

Attachment 8, Page 2 of 3

Waste Package Data Report For: RUDISILL

Nuclide		Activity (ci)
H	3	3.906814E-03
I	129	6.859232E-09
NP	237	7.842145E-05
PU	238	4.600353E-03
PU	239	9.684575E-03
PU	240	8.650000E-04
PU	241	2.960216E-02
SR	90	3.494110E-03
TC	99	1.611204E-04
U	233	3.678679E-05
U	234	4.330814E-05
U	235	1.431676E-06
Y	90	3.494110E-03
		8.9405E-02

Waste Package Storage Location History:

Date/Time of Movement*	Facility	Location	Unit
3/29/2010 12:26:19 PM	SRNL	None	None

**Note:* *This report only provides location history data gathered since implementation of WITS v3.0 on 10/1/97. Records indicating 10/1/97 may reflect package was placed in that location at any time prior to 10/1/97. Movements between facilities that do not correspond to a shipment record in the Shipment History section may be due to "Admin" shipments. Admin shipments are typically manipulations of WITS data only and DO NOT represent actual movements of the package. For inside packages this section does not show movements of the overpack.*

Waste Cuts:

Cut ID	Description	Waste Stream	Version	Calc Method	Date In	Contamination Level (DPM/100cm2)	Cut Wt (kg)	Activity (ci)
1	Routine	SRNLJCW-LLW	0	RAD	3/29/2010	NA	1,968.00	7.1300E-02
RUDISILL	Non-Routine	00524-LLW	2	CHAR BY PACK	3/29/2010	NA	92.00	1.8105E-02

Attachment 8, Page 3 of 3

Waste Package Data Report For: RUDISILL

Characterization By Package Isotope Activities:

Cut ID	Waste Stream ID	Version	Isotope	Activity (ci)
RUDISILL	00524-LLW	2		
			AM 241	2.1400E-04
			BA 137 M	9.3000E-04
			CS 137	9.8300E-04
			I 129	5.5700E-10
			PU 238	1.0500E-03
			PU 239	3.8600E-03
			PU 240	8.6500E-04
			PU 241	9.0700E-03
			SR 90	5.6400E-04
			U 234	4.2400E-06
			U 235	2.9100E-07
			Y 90	5.6400E-04
			Total Activity (ci):	1.8105E-02

Attachment 9: Non-Routine Waste Cut and Routine "SRNLJCW" (Minimum Mass) LLW Test Package – WITS Limit Checks

Attachment 9, Page 1 of 4

Generator Limit Check Report for the Destination Facility

Manifest Number / Package Number	Deviation Number	Destination Facility	Destination Location
RUDISILL		EAV	ETRENCH2

Limit ID	Limit Amount	Inventory Contribution	Package Contribution	LA - (IC + PC)	Limit Units	Limit Description	PASSED/ FAILED
62176	5.0000E+01	0.0000E+00	9.1689E-01	4.9083E+01	CI	ET- 50 FGE PACKAGE LIMIT	
62177	1.0000E-04	0.0000E+00	1.0847E-05	8.9153E-05	CI/KG	ENGINEERED TRENCH - TRU PACKAGE	
62205	1.5000E+01	0.0000E+00	8.1169E-01	1.4188E+01	CI	DOT 15-GRAM FISSILE - ETRENCH	
64126	1.0000E-02	0.0000E+00	1.6629E-06	9.9983E-03	CI/M3	MAY BE GTCC / WIR - IF FAILED CALL HLWD LEAD	
64127	9.9000E-01	0.0000E+00	1.2585E-01	8.6415E-01	CI/KG	MAY BE GTCC / WIR - IF FAILED CALL HLWD LEAD	
64128	1.0000E+00	0.0000E+00	9.4900E-08	1.0000E+00	CI/M3	MAY BE GTCC / WIR - IF FAILED CALL HLWD LEAD	
65794	4.0000E+00	0.0000E+00	2.5438E-02	3.9746E+00	CI	ET2 Package Limit- 4 PEC	
66314	5.0000E-02	0.0000E+00	2.0968E-03	4.7903E-02	CI	5% Pkg Screening ETXPA-BG1- If Failed Call SWE	
66315	5.0000E-02	0.0000E+00	2.5648E-03	4.7435E-02	CI	5% Pkg Screening ETXPA-BG2- If Failed Call SWE	
66316	5.0000E-02	0.0000E+00	5.6946E-05	4.9943E-02	CI	5% Pkg Screening ETXPA-BG3- If Failed Call SWE	

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Limit ID	Limit Amount	Inventory Contribution	Package Contribution	LA - (IC + PC)	Limit Units	Limit Description	PASSED/ FAILED
66317	5.0000E-02	0.0000E+00	4.3102E-04	4.9569E-02	CI	5% Pkg Screening ETXPA-Alpha1- If Failed Call SWE	
66318	5.0000E-02	0.0000E+00	3.5247E-04	4.9648E-02	CI	5% Pkg Screening ETXPA-Alpha2- If Failed Call SWE	
66319	5.0000E-02	0.0000E+00	3.0556E-04	4.9694E-02	CI	5% Pkg Screening ETXPA-Alpha3- If Failed Call SWE	
66320	5.0000E-02	0.0000E+00	1.2481E-07	5.0000E-02	CI	5% Pkg Screening ETXPA-Radium1- If Failed Call SWE	
66321	5.0000E-02	0.0000E+00	3.7824E-07	5.0000E-02	CI	5% Pkg Screening ETXPA-Radium2- If Failed Call SWE	
66322	5.0000E-02	0.0000E+00	4.1814E-07	5.0000E-02	CI	5% Pkg Screening ETXPA-Radium3- If Failed Call SWE	
66323	5.0000E-02	0.0000E+00	2.0680E-13	5.0000E-02	CI	5% Pkg Screening ETXPA-Uranium- If Failed Call SWE	
66324	5.0000E-02	0.0000E+00	1.1974E-03	4.8803E-02	CI	5% Pkg Screening ETXPA-AP1- If Failed Call SWE	
66325	5.0000E-02	0.0000E+00	1.3739E-03	4.8626E-02	CI	5% Pkg Screening ETXPA-AP2- If Failed Call SWE	
66326	5.0000E-02	0.0000E+00	1.1368E-03	4.8863E-02	CI	5% Pkg Screening ETXPA-AP3- If Failed Call SWE	
66327	5.0000E-02	0.0000E+00	9.3681E-07	4.9999E-02	CI	5% Pkg Screening ETXPA-Res- If Failed Call SWE	
66328	5.0000E-02	0.0000E+00	1.7464E-05	4.9983E-02	CI	5% Pkg Screening ETXPA-Drill- If Failed Call SWE	

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Limit ID	Limit Amount	Inventory Contribution	Package Contribution	LA - (IC + PC)	Limit Units	Limit Description	PASSED/ FAILED
66329	5.0000E-02	0.0000E+00	4.0233E-10	5.0000E-02	CI	5% Pkg Screening ETXPA-Air- If Failed Call SWE	
66330	5.0000E-02	0.0000E+00	3.9829E-14	5.0000E-02	CI	5% Pkg Screening ETXPA-Radon- If Failed Call SWE	
66348	5.0000E-03	0.0000E+00	2.0968E-03	2.9032E-03	CI	0.5% Pkg Screening ETXPA-BG1- If Failed Call SWE	
66349	5.0000E-03	0.0000E+00	2.5648E-03	2.4352E-03	CI	0.5% Pkg Screening ETXPA-BG2- If Failed Call SWE	
66350	5.0000E-03	0.0000E+00	5.6946E-05	4.9431E-03	CI	0.5% Pkg Screening ETXPA-BG3- If Failed Call SWE	
66351	5.0000E-03	0.0000E+00	4.3102E-04	4.5690E-03	CI	0.5% Pkg Screening ETXPA-Alpha1- If Failed Call SW	
66352	5.0000E-03	0.0000E+00	3.5247E-04	4.6475E-03	CI	0.5% Pkg Screening ETXPA-Alpha2- If Failed Call SW	
66353	5.0000E-03	0.0000E+00	3.0556E-04	4.6944E-03	CI	0.5% Pkg Screening ETXPA-Alpha3- If Failed Call SW	
66354	5.0000E-03	0.0000E+00	1.2481E-07	4.9999E-03	CI	0.5% Pkg Screening ETXPA-Radium1- If Failed Call S	
66355	5.0000E-03	0.0000E+00	3.7824E-07	4.9996E-03	CI	0.5% Pkg Screening ETXPA-Radium2- If Failed Call S	
66356	5.0000E-03	0.0000E+00	4.1814E-07	4.9996E-03	CI	0.5% Pkg Screening ETXPA-Radium3- If Failed Call S	
66357	5.0000E-03	0.0000E+00	2.0680E-13	5.0000E-03	CI	0.5% Pkg Screening ETXPA-Uranium- If Failed Call S	

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Limit ID	Limit Amount	Inventory Contribution	Package Contribution	LA - (IC + PC)	Limit Units	Limit Description	PASSED/ FAILED
66358	5.0000E-03	0.0000E+00	1.1974E-03	3.8026E-03	CI	0.5% Pkg Screening ETXPA-AP1- If Failed Call SWE	
66359	5.0000E-03	0.0000E+00	1.3739E-03	3.6261E-03	CI	0.5% Pkg Screening ETXPA-AP2- If Failed Call SWE	
66360	5.0000E-03	0.0000E+00	1.1368E-03	3.8632E-03	CI	0.5% Pkg Screening ETXPA-AP3- If Failed Call SWE	
66361	5.0000E-03	0.0000E+00	9.3681E-07	4.9991E-03	CI	0.5% Pkg Screening ETXPA-Res- If Failed Call SWE	
66362	5.0000E-03	0.0000E+00	1.7464E-05	4.9825E-03	CI	0.5% Pkg Screening ETXPA-Drill- If Failed Call SWE	
66363	5.0000E-03	0.0000E+00	4.0233E-10	5.0000E-03	CI	0.5% Pkg Screening ETXPA-Air- If Failed Call SWE	
66364	5.0000E-03	0.0000E+00	3.9829E-14	5.0000E-03	CI	0.5% Pkg Screening ETXPA-Radon- If Failed Call SWE	
67224	1.0000E+00	0.0000E+00	9.1689E-01	8.3106E-02	CI	FAIL = FISSILE RESTRICTIONS MAY APPLY- 1 FGE	

Attachment 10: HC2 SOF Calculation

Nuclide	Total Non-Routine (Ci)	HC 2 Threshold (Ci) [Ref. 8]	Non-Routine HC2 SOF
I-129	5.57E-10	4.3E+05	1.30E-15
Ba-137m	9.30E-04	NA	NA
Cs-137	9.83E-04	8.9E+04	1.10E-08
U-234	4.24E-06	2.2E+02	1.93E-08
U-235	2.91E-07	1.5E-03	1.90E-04
Pu-238	1.05E-03	6.2E+01	1.69E-05
Pu-239	3.86E-03	2.8E+01	1.36E-04
Pu-240	8.65E-04	5.5E+01	1.57E-05
Am-241	2.14E-04	5.5E+01	3.88E-06
Pu-241	9.07E-03	2.9E+03	3.13E-06
Sr-90	5.64E-04	2.2E+04	2.56E-08
Y-90	5.64E-04	4.3E+05	1.31E-09
TOTAL	**1.81E-02**		**3.66E-04**