

CCP-TP-168

Revision 3

CCP

Drum Waste Assay System
Imaging Passive/Active
Neutron/Segmented Gamma Scanner
Data Generation Level Validation

EFFECTIVE DATE: 11/17/2009

Larry Porter

PRINTED NAME

APPROVED FOR USE

RECORD OF REVISION

Revision Number	Date Approved	Description of Revision
0	10/18/2007	Initial issue.
1	11/17/2008	Revised in response to Central Characterization Project (CCP) Corrective Action Report (CAR)-ORNL-0007-08. Also, revised to clarify the assembly and contents of the Batch Data Report (BDR) and to make editorial corrections.
2	12/02/2008	Revised to remove redundant steps which direct the Independent Technical Reviewer (ITR) to repeat steps already performed by the Nondestructive Assay (NDA) Operator.
3	11/17/2009	Revised in response to U.S. Environmental Protection Agency (EPA) ORNL-CH-NDA-09- 002CR. References to control charts removed and editorial changes made.

TABLE OF CONTENTS

1.0 PURPOSE..... 4
1.1 Scope..... 4

2.0 REQUIREMENTS..... 4
2.1 References 4
2.2 Training Requirements..... 5
2.3 Equipment..... 5
2.4 Software..... 5

3.0 RESPONSIBILITIES..... 6
3.1 Nondestructive Assay (NDA) Operator 6
3.2 NDA Independent Technical Reviewer (ITR) 6
3.3 NDA Lead Operator (LO) 6
3.4 NDA Expert Analyst (EA) 6
3.5 Facility Records Custodian 7

4.0 PROCEDURE..... 8
4.1 Completion of Radioassay Data Sheet and Data Validation 8
4.2 Data Validation 10

5.0 RECORDS..... 15

LIST OF ATTACHMENTS

Attachment 1 – NDA Batch Data Report Cover Sheet 16
Attachment 2 – NDA Batch Data Report Table of Contents 17
Attachment 3 – NDA Batch Summary 18
Attachment 4 – DWAS IPAN Radioassay Data Sheet (Example) 19
Attachment 5 – SGS Radioassay Data Sheet (Example)..... 20
Attachment 6 – Expert Analysis Comment Sheet..... 21
Attachment 7 – ITR Checklist..... 22
Attachment 8 – DWAS IPAN Weekly Interfering Matrix Radioassay Data Sheet
(Example)..... 24
Attachment 9 – SGS Weekly Interfering Matrix Radioassay Data Sheet (Example) 25
Attachment 10 – SGS Automated ITR Sheets (Example) 26

1.0 PURPOSE

This procedure describes the generation of Batch Data Reports (BDRs) and BDR validation at the data generation level.

1.1 Scope

This procedure is applicable to all personnel who are responsible for generating and validating Drum Waste Assay System (DWAS) Imaging Passive/Active Neutron/Segmented Gamma Scanner (IPAN/SGS) BDRs.

2.0 REQUIREMENTS

2.1 References

Baseline Documents

- CCP-PO-003, *CCP Transuranic Authorized Methods for Payload Control (CCP CH-TRAMPAC)*

Referenced Documents

- CCP-PO-002, *CCP Transuranic Waste Certification Plan*
- ASTM Test Method C1493-01, *Standard Test Method for Non-Destructive Assay of Nuclear Material in Waste by Passive and Active Neutron Counting Using a Differential Die-Away System*
- BII-5183-ADD-001, *Imaging Passive/Active Neutron System (IPAN) Drum Waste Assay System (DWAS) Algorithm Definition Document*
- CCP-DWAS/IPAN/SGS-08-001, *DWAS IPAN Calibration Validation and Confirmation for Extended Passive Mode Operating Range*
- BII-TMU-5183 -001, *IPAN DWAS TMU Report*
- C1133-03, *Standard Test Method for Non-Destructive Assay of Special Nuclear Material in Low Density Scrap and Waste by Segmented Passive Gamma-Ray Scanning*
- C1207-03, *Standard Test Method for Non-Destructive Assay of Plutonium in Scrap and Waste by Passive Neutron Coincidence Counting*

- C1592-04, *Standard Guide for Nondestructive Assay Measurements*
- CCP-QP-002, *CCP Training and Qualification Plan*
- CCP-QP-005, *CCP TRU Nonconforming Item Reporting and Control*
- CCP-QP-008, *CCP Records Management*
- CCP-TP-166, *CCP Drum Waste Assay System Imaging Passive/Active Neutron Operations*
- CCP-TP-169, *Operating the Mobile Segmented Gamma Scanner*
- MCS-SGS0101-CAL-001, *SGS Calibration Report*
- NDA2000 Users Manual
- NUREG/CR-5550, LA-UR-90-732, *Passive Non-Destructive Assay of Nuclear Materials*
- PC/FRAM Isotopics Software Version Users Manual, Model S575
- CCP-QP-022, *CCP Software Quality Assurance Plan*

2.2 Training Requirements

2.2.1 All personnel performing this procedure will be trained and qualified in accordance with CCP-QP-002, *CCP Training and Qualification Plan* prior to performing this procedure.

2.3 Equipment

2.3.1 None

2.4 Software

2.4.1 NDA2000, Waste Assay

2.4.2 GENIE 2000, Gamma Acquisition and Analysis

2.4.3 DWAS.EXE

2.4.4 DNGI.EXE

2.4.5 DWASAnalysis.EXE

2.4.6 FRAM44.EXE

3.0 RESPONSIBILITIES

3.1 Nondestructive Assay (NDA) Operator

- 3.1.1 Provides NDA data to the NDA Expert Analyst (NDA EA).
- 3.1.2 Generates the BDR documents (e.g., Batch Data Report Cover Sheet, Batch Data Report Table of Contents, NDA Batch Summary).

3.2 NDA Independent Technical Reviewer (ITR)

NOTE

The NDA Independent Technical Reviewer (ITR) must be a qualified DWAS NDA Operator/ITR other than the NDA Operator who initially generated the data container in the BDR.

- 3.2.1 Verifies proper data reduction and documentation are complete.
- 3.2.2 Verifies Quality Control (QC) measurements are within QC requirements.
- 3.2.3 Ensures Attachment 1, Batch Data Report Cover Sheet is complete.
- 3.2.4 Ensures Attachment 2, Batch Data Report Table of Contents is completed and BDR is paginated.
- 3.2.5 Ensures Attachment 3, NDA Batch Summary is complete.
- 3.2.6 Completes Attachment 7, ITR Checklist.

3.3 NDA Lead Operator (LO)

- 3.3.1 Ensures the overall quality of the BDR and that the BDR is assembled correctly.

3.4 NDA Expert Analyst (EA)

- 3.4.1 Analyzes Weekly Interfering Matrix Source Measurements and generates a Weekly Interfering Matrix Radioassay Data Sheet (RDS) (See Attachment 8, DWAS IPAN Weekly Interfering Matrix, and Attachment 9, SGS Weekly Interfering Matrix, for an example).
- 3.4.2 Determines applicability of Acceptable Knowledge (AK) documentation as opposed to measured values.

- 3.4.3 Generates SGS RDS, DWAS IPAN RDS, and provides them as appropriate to NDA Operator for inclusion in the BDR.
- 3.4.4 Reviews assay data and selects appropriate analysis mode, if applicable.
- 3.4.5 Resolves discrepancies in assay data and documents resolutions.
- 3.4.6 Prepares electronic files for submission to the Facility Records Custodian.
- 3.4.7 Evaluates QC measurement trends and bias.
- 3.4.8 Evaluates the quality of the data produced from the NDA instrumentation.
- 3.5 Facility Records Custodian
 - 3.5.1 Receives, processes, and transmits all records generated by this procedure in accordance with CCP-QP-008, *CCP Records Management*.

4.0 PROCEDURE

4.1 Completion of Radioassay Data Sheet and Data Validation

NOTE

Qualification and determination of a drum's final result may be determined using the data from the Segmented Gamma Scanner (SGS) alone or the Drum Waste Assay System Imaging Passive/Active Neutron (DWAS IPAN) alone. The NDA EA upon review of the available data will make this determination. Additionally, the NDA EA may import specific isotope(s) quantified by the SGS into the DWAS IPAN software, as appropriate, to be reported on the DWAS IPAN Radioassay Data Sheet.

Typically gamma data from the SGS and neutron data from the DWAS IPAN are available to the NDA EA for qualification and determination of final results. In material where isotopic composition is known based on accepted and approved AK the DWAS IPAN neutron data can be used with this AK data per the NDA EA's discretion to determine final assay results.

The SGS generates high resolution gamma spectroscopic data which may be used to generate the Radioassay Data Sheet or for determination of relative measured isotopic fractions which may be combined with DWAS IPAN neutron data to generate the final radioassay data.

The Fixed energy Response function Analysis with Multiple efficiencies (FRAM44) software is used to analyze the SGS data to produce relative isotopic fractions. The DWAS Neutron Gamma Integration (DNGI) software combines isotopic fractions with the DWAS IPAN neutron data to determine final activity and masses for all required radionuclides. Where measured isotopics cannot be validated, AK values may be used. Both the FRAM44 and DNGI software are off-the-shelf system software applications. The final results of the DNGI analysis are indicated on the Radioassay Data Sheet.

For radionuclides that are not directly measured such as Sr-90 and U-234, AK and/or appropriate scaling factors are used for quantification as indicated in the NDA Memoranda developed for each AK Summary Report.

NDA Operator

4.1.1 Provide assay and QC data to the NDA EA for analysis and review.

NDA EA

4.1.2 Prior to performing analysis, ensure that the software to be used is on the Software Inventory List in accordance with CCP-QP-022.

- 4.1.3 Generate SGS Radioassay Data Sheet(s) (See Attachment 5, SGS Radioassay Data Sheet, for an example).
- 4.1.4 Analyze data for consistency and correlation between applicable modes.
- 4.1.5 Generate additional supporting data reports (such as a calculation data sheet) as required for 100 percent data validation.
- 4.1.6 Generate DWAS IPAN Radioassay Data Sheet(s). (See Attachment 4, DWAS/IPAN Radioassay Data Sheet, for an example.)

NOTE

Both the SGS and the IPAN Radioassay Data sheets are evaluated for the weekly interfering matrix. Therefore, the Final Radioassay Data sheet for the weekly interfering matrix applies to both the SGS and IPAN. This will be documented in Section 7 of Attachment 6, Expert Analysis Comment Sheet, by checking both SGS and IPAN.

- 4.1.7 Determine the analysis method selection from the following options:
 - SGS (Final Radioassay Data sheet from SGS)
 - IPAN (Final Radioassay Data sheet from IPAN)
 - Both IPAN and SGS Rejected (Both Radioassay Data Sheets to be stamped "Not Used for Characterization.")
- 4.1.8 Document in Section 8 of Attachment 6 all isotope(s) quantified by SGS and imported into the DWAS IPAN data for reporting on the DWAS IPAN RDS, as required.
- 4.1.9 Complete Sections 1 through 6 and document the analysis method selection in Section 7 of Attachment 6.
- 4.1.10 Record, as appropriate, the appropriate technical justification, data evaluation criteria, and reference documentation used to determine the analysis method for calculation of final radioassay data in Section 8 of Attachment 6.
- 4.1.11 Provide the SGS and DWAS IPAN Radioassay Data Sheet(s), EACS, and the AITR Sheets (See Attachment 10, SGS Automated ITR Sheets for an example) to the NDA Operator.

4.2 Data Validation

NOTE

To compile the BDR, the SGS, and DWAS IPAN Radioassay Data Sheets are combined with the associated QC records, including the following:

- Daily Instrument Performance Background and Source Measurement Results (DWAS IPAN) and daily QC Background and Calibration Checks (SGS)
- Weekly Interfering Matrix Radioassay Data Sheet (SGS and DWAS IPAN)

Any data affecting changes to SGS/DWAS IPAN BDR documents (e.g., QC records) SHALL require a one-time notice in the NDA Batch Summary.

Associated records are compiled to assemble a BDR, where review and approval provides final validation. The BDR will use the following Sequence Number Convention unless otherwise specified within the NDA Batch Summary: OR-DWAS-XXXX where OR is the facility, DWAS represents both the SGS and the DWAS IPAN, and XXXX is the sequence number.

The NDA ITR is a qualified individual, other than the NDA Operator, who is identified to perform the function of an NDA ITR. A review checklist for ITR is used to document validation.

NDA Operator

- 4.2.1 Obtain the SGS and IPAN Radioassay Data Sheet(s) and associated Expert Analyst Comment Sheet(s) and SGS Automated ITR Sheet(s) for the BDR.
-

NOTE

The NDA Operator may contact the NDA LO or the NDA EA to resolve questions or issues during the review of the SGS and IPAN Radioassay Data Sheet(s).

- 4.2.2 Determine whether the SGS, the IPAN Radioassay Data Sheet, or neither will be used as the final Radioassay Data Sheet using Section 7 of Attachment 6.
- 4.2.3 Stamp the SGS and/or IPAN Radioassay Data sheet(s) that will **NOT** be used as the final Radioassay Data Sheet for a waste container "Not Used for Characterization".
- 4.2.4 Review the SGS and IPAN Radioassay Data Sheets provided by the NDA EA for the BDR.

- 4.2.5 Resolve any issues or questions resulting from the review of the Radioassay Data Sheets.
- 4.2.6 Print name, sign, **AND** date the SGS and IPAN Radioassay Data Sheet(s).
- 4.2.7 Generate a Nonconformance Report (NCR) in accordance with CCP-QP-005, *CCP TRU Nonconforming Item Reporting and Control* where the Radioassay Data Sheet for the method selected by the NDA EA in Section 8 of Attachment 6 indicates one or more of the following for each waste container:
- [A] TRU alpha activity concentration is less than or equal to 100 nCi/g.
 - [B] Plutonium equivalent activity is greater than 80 Plutonium-239 Equivalent Activity (PE-Ci).
 - [C] Where Plutonium-239 Fissile Gram Equivalent (FGE) plus two times the associated TMU is greater than 200 FGE.
 - [D] When both SGS and IPAN assays are rejected.
- 4.2.8 Obtain and assemble:
- [A] Batch Data Report Cover Sheet (Attachment 1).
 - [B] Batch Data Report Table of Contents (Attachment 2).
 - [C] NDA Batch Summary (Attachment 3).
 - [D] Validated Verification Assay Results Sheet (from CCP-TP-166, *CCP Drum Waste Assay System Imaging Passive/Active Neutron Operations*, Attachment 2).
 - [E] DWAS/IPAN QC Final Reports (Instrument Performance Background and Source measurements from CCP-TP-166, Attachment 3).
 - [F] SGS QC Last Results Reports (QC Background and Transmission and QC Calibration Check from CCP-TP-169, Attachment 1).
 - [G] NDA Operator reviewed DWAS IPAN Radioassay Data Sheet(s) (See Attachment 4, DWAS IPAN Radioassay Data Sheet, for an example).

- | [H] NDA Operator reviewed SGS Radioassay Data Sheet(s) (See Attachment 5, SGS Radioassay Data Sheet, for an example).

- | [I] Expert Analysis Comment Sheet(s) (Attachment 6).

- | [J] SGS Automated ITR Sheet(s) (See Attachment 10, SGS Automated ITR Sheets, for an example.)

- [K] Supporting calculation data sheet, as required (e.g., supporting calculations to compensate for sources of interference such as plutonium fluoride).

- [L] SGS and DWAS IPAN Weekly Interfering Matrix/Source Radioassay Data Sheets (See Attachment 8, DWAS IPAN Weekly Interfering Matrix Radioassay Data Sheet and Attachment 9, SGS Weekly Interfering Matrix Radioassay Data Sheet, for an example).

- [M] ITR Checklist (Attachment 7).

- [N] Nonconformance Report(s) (NCR), if applicable.

4.2.9 Forward the BDR to the NDA ITR.

NDA ITR

NOTE

“Not Used for Characterization” Radioassay Data Sheets (RDSs) along with the associated EACS and AITR, are supplied to document that both modes of operation were evaluated by the Expert Analysts. The RDS of record is the RDS **NOT** labeled “Not Used for Characterization” and documents the valid assay results. The validation of the BDR, such as drum ID, waste stream information, assay procedure, etc., will be based on the valid assay results and not on the data contained in the “Not Used for Characterization” RDS. When both the IPAN and SGS assays are rejected, both RDS will be stamped “Not Used for Characterization” and an associated NCR will be included with the BDR.

NOTE

The Radioassay Data order will be: Radioassay Data Sheet used for characterization, “Not Used for Characterization” Radioassay Data Sheet, Automated ITR sheet, and EACS for each drum.

4.2.10 Order and paginate the report.

4.2.11 Enter the page numbers on the NDA Batch Data Report Table of Contents.

4.2.12 Complete, print name, sign, and date the Batch Data Report Cover Sheet.

4.2.13 Complete, print name, sign, and date the NDA Batch Summary.

NOTE

Both the DWAS/IPAN and the SGS software report all measured radionuclides. Therefore, the radionuclides contributing to 95 percent of the radioactive hazards are reported on the Radioassay Data Sheet.

4.2.14 Review the BDR using the ITR Checklist.

4.2.15 Resolve any discrepancies.

4.2.16 Complete, print name, sign, and date the ITR Checklist.

4.2.17 Copy electronic data to CD and backup CD.

4.2.18 Label CD including the following:

- Originating Organization

- File Name
- File Directory
- Last Entry Date
- Retention Period
- Original Software used
- Version of Software used

4.2.19 Forward the BDR and CDs to the NDA LO.

NDA LO

4.2.20 Review the BDR, **AND** resolve any discrepancies with the NDA ITR.

4.2.21 Submit completed BDR to the Facility Records Custodian.

4.2.22 Submit completed CDs to the Facility Records Custodian.

Facility Records Custodian

4.2.23 Receive, process, and transmit completed BDR and CDs in accordance with CCP-QP-008.

5.0 RECORDS

5.1 Records generated during the performance of this procedure are maintained in accordance with CCP-QP-008. The records generated by this procedure are as follows:

5.1.1 QA/Lifetime

NDA Batch Data Report

- [A] Verification Assay Results Sheet (from CCP-TP-166)
- [B] Attachment 1 – NDA Batch Data Report Cover Sheet
- [C] Attachment 2 – NDA Batch Data Report Table of Contents
- [D] Attachment 3 – NDA Batch Summary
- [E] Attachment 4 and 5 – SGS and DWAS IPAN Radioassay Data Sheet(s)
- [F] Attachment 6 – Expert Analysis Comment Sheet(s)
- [G] Attachment 7 – ITR Checklist
- [H] Attachment 8 and 9 – DWAS IPAN and SGS Weekly Interfering Matrix
- [I] Attachment 10 – SGS AITR Sheet(s)
- [J] Final Reports (Instrument Performance Background and Source measurements from CCP-TP-166)
- [K] Last Results Reports (QC Background and Transmission and QC Calibration Check from CCP-TP-169)
- [L] Supporting calculation data sheets as required (e.g., Interference Corrections, AK and Background Corrections)

5.1.2 QA/Nonpermanent Records

- [A] Raw Data files which includes Radioassay Data Sheet Information (electronic) CD
 - [A.1] Primary CD
 - [A.2] Backup CD

Attachment 2 – NDA Batch Data Report Table of Contents

NDA Batch Number: _____

Testing Facility: _____

SECTION	PAGE NUMBER
NDA Batch Data Report Cover Sheet	
NDA Batch Data Report Table of Contents	
NDA Batch Summary	
Quality Control Sheets	
Copy of NCR(s), if applicable	
Weekly Interfering Matrix	
Radioassay Data	
ITR Checklist	
Supplemental Data	

Attachment 3 – NDA Batch Summary

NDA Batch Number: _____

Date: _____

Quality Control Summary:

Nonconformances:

NDA Independent Technical Reviewer Comments:

Printed Name: _____

Signature and Date: _____ / _____

Attachment 4 – DWAS IPAN Radioassay Data Sheet (Example)

Radioassay Data Sheet

11:48:50 Monday, July 23, 2007 - Page 1 of 1

Version Information

DWAS Version: 1.10
DWAS Acquisition SW Version: 3.02
DWAS Analysis SW Version: 1.20
Calculation DLL: 1.10, License File DLL: 1.10, Password DLL: 1.10, Report DLL: 1.10
Neutron Data Import DLL: 1.10, Gamma Data Import DLL: 1.30, Data Archive DLL: 1.10
DWAS.acl Version: 2.8, DWAS.GLB Version: 2.1, DWAS.MDA Version: 2.2

PCFRAM Analysis Version: 4.4

Identifying Data

Radioassay Procedure: T-CH-252-P-OP-100 Rev 9
Facility: DWAS/IPAN/SGS
Neutron Assay Date and Time: Fri Oct 27 09:18:34 2006 Gamma Assay Date and Time: 10/23/2006 13:19:02
DWASAnalysis Filename 061023_P08.NEU PCFRAM Filename: 00001399_cntr0001_dcat0001_proc00a1.r01
DWAS results File: C:\DWAS_Analysis_Package\DWAS_Results\00001399_cntr0001_dcat0001_proc00a1.ngi

Tare Weight: 32.40 kg Gross Weight: 48.60 kg Net Weight: 16.20 kg
Gamma Live Time: 119.00 s Gamma Real Time: 120.00 s Gamma Percent Dead Time: 0.83

Neutron Cont. ID: X10C0501536 Gamma Cont. ID: cntr0001
Neutron Equipment ID: DWAS Gamma Equipment ID: 00001399
Neutron User ID: Deborah Satterfield DWAS Analyst ID: JOHN WEST

Imported Pu240e Mass: -0.004128 g Imported Pu240e Mass Uncertainty: -0.016065 g
Corrected Pu240e Mass: 0.059490 g Corrected Pu240e Mass TMU: -0.016065 g
Imported Pu239e Mass: 0.003711 g Imported Pu239e Mass Uncertainty: 0.001273 g
Corrected Pu239e Mass: 0.003711 g Corrected Pu239e Mass TMU: 0.001273 g

PCFRAM Parameter Set: LowE_DWAS_250_Rev2 (2006.07.18 03:55)0 Coax 0.25 kev/ch, inc 96 - 106

Isotope	Fraction (g/gPu)	Fraction Uncertainty (g/gPu)	Mass (g)	Mass TMU at 1-Sigma (g)	Activity (Ci)	Activity TMU at 1-Sigma (Ci)	Rule Used	Mode
Pu238	7.2688e-002	0.0000e+000	3.0103e-004	1.0326e-004	5.2079e-003	1.7865e-003	AK	Active
Pu239	8.0586e-001	0.0000e+000	3.3375e-003	1.1449e-003	2.0993e-004	7.2012e-005	AK	Active
Pu240	8.8085e-002	0.0000e+000	3.6480e-004	1.2514e-004	8.3904e-005	2.8782e-005	AK	Active
Pu241	4.7692e-003	0.0000e+000	1.9751e-005	6.7754e-006	2.0542e-003	7.0464e-004	AK	Active
Pu242	2.8595e-002	0.0000e+000	1.1843e-004	4.0624e-005	4.7015e-007	1.6128e-007	AK	Active
Am241	5.9800e-002	0.0000e+000	2.4762e-004	8.4941e-005	8.5923e-004	2.9475e-004	AK	Active
Np237	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	Not In AK	Active
U235	1.0100e-001	0.0000e+000	4.1822e-004	1.4346e-004	9.1590e-010	3.1418e-010	AK	Active
Am243	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	Not In AK	Active
Cs137	< LLD						< LLD	
U233	< LLD						< LLD	
U238	< LLD						< LLD	
Cm244	2.3900e-002	0.0000e+000	1.1310e-007	3.0544e-008	9.2520e-006	2.4985e-006	AK	Passive
Ra226	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	Not In AK	Active
Sr90	< LLD						< LLD	
U234	< LLD						< LLD	
Po231	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	Not In AK	Active
Cf252	2.9800e-006	0.0000e+000	1.4103e-011	3.8084e-012	7.6718e-009	2.0718e-009	AK	Passive

AK Set Selected: ORFWENC-008

	Value	TMU at 1-Sigma
Total Thermal Power (Watts):	2.1074e-004	7.2186e-005
Total Plutonium Active Mass (g):	4.1408e-003	1.4204e-003
Total Plutonium Passive Mass (g):	4.7324e-006	1.2780e-006
Total Plutonium Isotope Sum Mass (g):	4.1415e-003	1.4207e-003
Total Pu239 FGE (g Pu239 FGE):	3.6986e-003	1.2687e-003
Total Pu239 Equivalent Activity (PE-Ci):	5.9331e-003	2.0336e-003
Total Alpha Activity (Ci):	6.3707e-003	2.1822e-003
Total TRU Alpha Activity (Ci):	6.3614e-003	2.1822e-003
Total TRU Alpha Activity Concentration (nCi/g):	3.9268e+002	1.3470e+002
ABSMOD:	121.079940	
MOD:	4.945438	
Active MDA (g-Pu239e):	0.001508	
Passive MDA (g-Pu240e):	0.059490	
MDC (nCi/g):	159.929500	
FGE For Criticality Control	0.006185	(g Pu239 FGE)

Warning Messages

Assay Identification Parameters (User ID and/or Radio-Assay Procedure) have been Overridden.

Operator Name: Operator Signature: Date

Reviewer Name: Reviewer Signature: Date

Attachment 5 – SGS Radioassay Data Sheet (Example)

Radioassay Data for X10C9312882

***** Radioassay Data Sheet *****

Engine Version: TMU Gamma 1.5

Assay Instrument: Segmented Gamma S Location: TWPC
Analysis Method: T-CH-252-P-OP-103, Rev. 10 Software Version: NDA 20
V.4.0

Item ID: X10C9312882 Analysis Date: 6/22/2007

Source of isotopics: DECLARED

Net Weight 18800.0 g
Pu mass <LLD
TRU Alpha Activity 5.98E-004 +- 6.97E-005 Ci
TRU Activity Concentration 3.18E+001 +- 3.71E+000 nCi/g
Pu-239 Equivalent Activity 5.99E-004 +- 6.97E-005 Ci
Pu-239 FGE 1.08E-004 +- 1.26E-005 g
Decay heat 2.00E-005 +- 2.33E-006 W

Nuclide	Mass g	Mass Unc. g	Activity Ci	Activity Uncert. Ci	MDA Ci
SR90	2.01E-008	2.48E-009	2.78E-006	3.43E-007	0.00E+000
CS137	3.17E-008	3.91E-009	2.78E-006	3.43E-007	9.27E-008
RA226	0.00E+000	0.00E+000	0.00E+000	0.00E+000	1.97E-007
TH228	3.35E-010	4.62E-011	2.77E-007	3.83E-008	1.39E-007
TH229	0.00E+000	0.00E+000	0.00E+000	0.00E+000	3.12E-007
U233	<LLD	0.00E+000	<LLD	0.00E+000	1.32E-003
U234	<LLD	0.00E+000	<LLD	0.00E+000	0.00E+000
U235	0.00E+000	0.00E+000	0.00E+000	0.00E+000	2.00E-007
NP237	0.00E+000	0.00E+000	0.00E+000	0.00E+000	2.57E-007
PU238	<LLD	0.00E+000	<LLD	0.00E+000	2.62E-003
U238	<LLD	0.00E+000	<LLD	0.00E+000	1.40E-005
PU239	<LLD	0.00E+000	<LLD	0.00E+000	2.07E-003
PU240	<LLD	0.00E+000	<LLD	0.00E+000	5.35E-004
AM241	1.64E-004	2.01E-005	5.69E-004	6.97E-005	3.12E-006
PU241	0.00E+000	0.00E+000	0.00E+000	0.00E+000	1.39E-003
PU242	<LLD	0.00E+000	<LLD	0.00E+000	0.00E+000
AM243	9.36E-005	1.13E-005	1.89E-005	2.29E-006	5.89E-007
CM243	0.00E+000	0.00E+000	0.00E+000	0.00E+000	1.06E-006
CM245	0.00E+000	0.00E+000	0.00E+000	0.00E+000	1.15E-006
CF249	2.31E-006	2.79E-007	9.55E-006	1.16E-006	1.31E-007

Errors quoted at 1.000 sigma

Operator: _____ Date: _____

Reviewer: _____ Date: _____

Attachment 6 – Expert Analysis Comment Sheet

1. DRUM ID:	
2. ASY FILE / RUN #:	
3. SGS SEQUENCE #:	
4. FRAM Analysis:	
<input type="checkbox"/> FRAM Analysis not performed, see Comments <input type="checkbox"/> FRAM Analysis performed [Complete Boxes 4a and 4b]	
	4a. FRAM Parameter Set:
	<input type="checkbox"/> Coax_DWAS_250_rev1, 0.25 keV/ch (>125 keV) <input type="checkbox"/> LowE_DWAS_250_rev2, 0.25 keV/ch, with 96-106 keV <input type="checkbox"/> Other, see Comments
	4b. FRAM Efficiency Method:
	<input type="checkbox"/> Empirical <input type="checkbox"/> Physical: coax, U/Pu 0.1-50, Al 0.1-100, Fe 0.1-100, Cd 0.2-3 <input type="checkbox"/> Other, see Comments
5. AK Stream: (Note AK Stream Used)	
6. DWAS Neutron Gamma Integration (DNGI) Analysis:	
<input type="checkbox"/> DNGI analysis not performed, see Comments <input type="checkbox"/> DNGI analysis performed [Complete Boxes 6a, 6b and 6c]	
	6a. AK File Used:
	<input type="checkbox"/> DNGI.AKL Default <input type="checkbox"/> Alternate AKL, see Comments
	6b. DNGI Analysis Isotopics Selection:
	<input type="checkbox"/> DNGI isotopics reviewed and accepted <input type="checkbox"/> DNGI isotopics over-ridden: <input type="checkbox"/> forced AK for all Pu isotopes <input type="checkbox"/> forced AK for Am-241 <input type="checkbox"/> forced AK for other isotopes, see Comments.
	6c. DNGI Analysis IPAN Mode Selection:
	<input type="checkbox"/> DNGI active / passive mode selection reviewed and accepted <input type="checkbox"/> DNGI active / passive mode selection over-ridden: <input type="checkbox"/> forced active mode, see alternate AKL file <input type="checkbox"/> forced passive mode, see alternate AKL file
	7. Method used to calculate final radioassay data:
<input type="checkbox"/> IPAN <input type="checkbox"/> SGS <input type="checkbox"/> Rejected both IPAN and SGS (Both Radioassay Data Sheets to be stamped "Not Used for Characterization")	
8. Expert Analysis Comments:	
9. Expert Analyst Name:	
10. Expert Analyst Signature:	11. Date:

Batch Data Report Number:		
Procedure/Rev. Number:		
Y/N/NA	Enter Y (Yes), N (No), NA (Not Applicable) as required	
	Do testing batch data correctly lists the testing facility name, testing batch number, waste container numbers included in the batch, and NDA Operators' and Reviewers' Signatures and date?	
	Out of Range conditions have been appropriately dispositioned? These include: MOD Index, ABSMOD Index, Effective Pu Values, and Average Flux per Grab? The acceptable ranges for these variables are in the Calibration and Validation Report (CCP-DWAS/IPAN/SGS-08-001, <i>DWAS IPAN Calibration Validation and Confirmation for Extended Passive Mode Operating Range.</i>)	
	Are weekly interfering matrix results and daily instrument performance results reported as specified in CCP-TP-168?	
	Are instrument performance results within warning limits and boundaries? These include: DWAS IPAN (Raw Coincidence Count Rate, Pu-239 Effective Mass and Pu-240 Effective Mass) and SGS (344.3 keV Centroid, 344.3 keV Full Width at Half Maximum (FWHM), Gamma QC Background, and Weighted Mean Activity.	
	Are reported results within the calibration range?	
	Correct waste container weight(s) were entered and used in the Radioassay process?	
	Have data been analyzed in a technically correct manner in accordance with the methods used?	
	Have all required isotopes been reported if not automatically reported? Ensure the ten WIPP-tracked radionuclides are reported (Am-241, Pu-238, Pu-239, Pu-240, Pu-242, U-233, U-234, U-238, Sr-90 and Cs-137).	
	Was U-235 identified in any waste container?	
	Are the data reasonable, based on the technique used?	
	Have the data quality objectives been demonstrated including determination of MDC (LLD), TMU, Pu-239 fissile gram equivalent, decay heat, and calibration per requirements in CCP-PO-002?	

Attachment 7 – ITR Checklist (Continued)

Page 2 of 2

Batch Data Report Number:	
Procedure/Rev. Number:	
Y/N/NA	Enter Y (Yes), N (No), NA (Not Applicable) as required
	Are units properly reported?
	Have calculations been verified as required? (Note supporting calculations such as AK and Background must be verified)
	Has software been approved in accordance with CCP-QP-022?
	Have data been reviewed for transcription errors?
	Are testing data Quality Assurance (QA) documentation complete? --Batch Data Report Cover Sheet --BDR Table of Contents --Batch Summary --Validated Verification Assay Results Sheet --Final and Last Results Reports (Background and Source) --Weekly Interfering Matrix/Source Measurements --Radioassay Data Sheets --Expert Analysis Comment Sheets --Supporting Calculation Data Sheets (e.g., Interference Corrections, AK and Background Corrections) --NCR (if applicable)
Comments:	

ITR Review By: (Print/Sign/Date)

Attachment 8 – DWAS IPAN Weekly Interfering Matrix Radioassay Data Sheet
(Example)

Radioassay Data Sheet

Version Information

DNGI Version: 1.10
DWAS Acquisition SW Version: 3.02
DWAS Analysis SW Version: 1.20
PCFRAM Analysis Version: 4.4
Calculation DLL: 1.10, License File DLL: 1.10, Password DLL: 1.10, Report DLL: 1.10
Neutron Data Import DLL: 1.10, Gamma Data Import DLL: 1.30, Data Archive DLL: 1.10
DNGI.akl Version: 2.8, DNGI.GLB Version: 2.1, DNGI.MDA Version: 2.2

Identifying Data

Radioassay Procedure: T-CH-252-P-OP-100 Rev 11
Facility: DWAS/IPAN/SGS
Neutron Assay Date and Time: Mon Sep 24 19:04:57 2007 Gamma Assay Date and Time: 08\29\2007 08:19:11
DWASAnalysis Filename 070829_P03.NEU PCFRAM Filename: 00002545_cntr0001_dcat0001_proc00ai.r01
DNGI results File: C:\DWAS_Analysis_Package\DNGI_Results\00002545_cntr0001_dcat0001_proc00ai.ngi

Tare Weight: 22.73 kg Gross Weight: 73.64 kg Net Weight: 50.91 kg
Gamma Live Time: 114.00 s Gamma Real Time: 120.00 s Gamma Percent Dead Time: 5.00

Neutron Cont. ID: Weekly Interfering Matrix Gamma Cont. ID: cntr0001
Neutron Equipment ID: DWAS Gamma Equipment ID: 00002545
Neutron User ID: Deborah Satterfield DNGI Analyst ID: JOHN_WEST

Imported Pu240e Mass: 1.801444 g Imported Pu240e Mass Uncertainty: 0.468031 g
Corrected Pu240e Mass: 1.801444 g Corrected Pu240e Mass TMU: 0.468031 g
Imported Pu239e Mass: 48.810572 g Imported Pu239e Mass Uncertainty: 12.160171 g
Corrected Pu239e Mass: 48.810572 g Corrected Pu239e Mass TMU: 12.160171 g

PCFRAM Parameter Set: Coax_DWAS_250_rev1 (2006.07.18 03:52)0 Coax 0.25 kev/ch0results file:

Isotope	Fraction (g/gPu)	Fraction Uncertainty (g/gPu)	Mass (g)	Mass TMU at 1-Sigma (g)	Activity (Ci)	Activity TMU at 1-Sigma (Ci)	Rule Used	Mode
Pu238	2.4300e-004	4.1966e-005	7.1219e-003	2.3512e-003	1.2321e-001	4.0675e-002	FRAM	Passive
Pu239	9.3800e-001	6.7536e-003	2.7491e+001	7.7663e+000	1.7292e+000	4.8850e-001	FRAM	Passive
Pu240	5.9824e-002	6.8020e-003	1.7533e+000	4.5559e-001	4.0327e-001	1.0479e-001	FRAM	Passive
Pu241	1.3250e-003	2.3187e-005	3.8834e-002	1.0988e-002	4.0387e+000	1.1427e+000	FRAM	Passive
Pu242	6.0900e-004	7.6430e-005	1.7849e-002	5.5008e-003	7.0860e-005	2.1838e-005	FRAM	Passive
Am241	3.4368e-003	9.6230e-005	1.0073e-001	2.8586e-002	3.4952e-001	9.9192e-002	FRAM	Passive
Np237	1.2050e-004	1.1857e-005	3.5317e-003	1.0562e-003	2.5181e-006	7.5305e-007	FRAM	Passive
U235	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	Not In AK	Active
Am243	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	Not In AK	Passive
Cs137	1.7220e-010	2.7776e-011	5.0469e-009	1.6414e-009	4.4413e-007	1.4444e-007	FRAM	Passive
U233	< LLD						< LLD	
U238	< LLD						< LLD	
Cm244	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	Not In AK	Passive
Ra226	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	Not In AK	Passive
Sr90	1.0981e-010	1.7712e-011	3.2183e-009	1.0467e-009	4.4413e-007	1.4444e-007	Pri Scale	Passive
U234	< LLD						< LLD	

AK Set Selected: WG-Pu

	Value	TMU at 1-Sigma
Total Thermal Power (Watts):	8.2058e-002	2.1385e-002
Total Plutonium Active Mass (g):	5.1793e+001	1.2908e+001
Total Plutonium Passive Mass (g):	2.9308e+001	8.2769e+000
Total Plutonium Isotope Sum Mass (g):	2.9308e+001	7.6197e+000
Total Pu239 FGE (g Pu239 FGE):	2.7621e+001	7.1789e+000
Total Pu239 Equivalent Activity (PE-Ci):	2.6733e+000	6.9650e-001
Total Alpha Activity (Ci):	2.6054e+000	6.7897e-001
Total TRU Alpha Activity (Ci):	2.6053e+000	6.7894e-001
Total TRU Alpha Activity Concentration (nCi/g):	5.1174e+004	1.3336e+004
ABSMOD:	261.421273	
MOD:	11.173759	
Active MDA (g-Pu239e):	0.016946	
Passive MDA (g-Pu240e):	0.082300	
MDC (nCi/g):	2337.914087	
FGE For Criticality Control	41.691497	(g Pu239 FGE)

Warning Messages

Assay Identification Parameters (User ID and/or Radio-Assay Procedure) have been Overridden.

Operator Name: _____ Operator Signature: _____ Date: _____
Reviewer Name: _____ Reviewer Signature: _____ Date: _____

Attachment 9 – SGS Weekly Interfering Matrix Radioassay Data Sheet (Example)

Radioassay Data for WEEK INT MATRIX

***** Radioassay Data Sheet *****

Engine Version: TMU Gamma 1.5

Assay Instrument: Segmented Gamma S Location: TWPC
 Analysis Method: T-CH-252-P-OP-103,Rev.10 Software Version: NDA 2000 V.4.0
 Item ID: WEEK INT MATRIX Analysis Date: 8/29/2007

NID identified fiducial nuclide PU-239

Source of isotopics: MEASURED

Net Weight 50900.0 g
 Pu mass 3.10E+001 +- 3.62E+000 g
 TRU Alpha Activity 2.62E+000 +- 2.38E-001 Ci
 TRU Activity Concentration 5.16E+004 +- 4.67E+003 nCi/g
 Pu-239 Equivalent Activity 2.70E+000 +- 2.38E-001 Ci
 Pu-239 FGE 2.91E+001 +- 3.61E+000 g
 Decay heat 8.24E-002 +- 7.38E-003 W

Nuclide	Mass g	Mass Unc. g	Activity Ci	Activity Uncert. Ci	MDA Ci
SR90	7.22E-009	9.62E-010	9.97E-007	1.33E-007	0.00E+000
CS137	1.14E-008	1.51E-009	9.97E-007	1.33E-007	8.82E-008
U232	0.00E+000	0.00E+000	0.00E+000	0.00E+000	1.95E-007
U233	<LLD	0.00E+000	<LLD	0.00E+000	2.05E-003
U234	<LLD	0.00E+000	<LLD	0.00E+000	0.00E+000
U235	0.00E+000	0.00E+000	0.00E+000	0.00E+000	3.32E-007
NP237	2.72E-003	3.78E-004	1.94E-006	2.70E-007	4.56E-007
PU238	4.05E-003	7.91E-004	7.00E-002	1.37E-002	1.96E-004
U238	<LLD	0.00E+000	<LLD	0.00E+000	1.24E-005
PU239	2.89E+001	3.61E+000	1.82E+000	2.27E-001	5.10E-003
PU240	1.97E+000	2.52E-001	4.54E-001	5.78E-002	1.27E-003
AM241	8.09E-002	1.02E-002	2.81E-001	3.54E-002	7.88E-004
PU241	4.02E-002	5.14E-003	4.18E+000	5.35E-001	1.17E-002
PU242	8.57E-003	1.43E-003	3.40E-005	5.66E-006	0.00E+000
AM243	0.00E+000	0.00E+000	0.00E+000	0.00E+000	1.00E-006
CM243	0.00E+000	0.00E+000	0.00E+000	0.00E+000	1.09E-006
CM245	0.00E+000	0.00E+000	0.00E+000	0.00E+000	1.94E-006
CF249	0.00E+000	0.00E+000	0.00E+000	0.00E+000	2.20E-007

Errors quoted at 1.000 sigma

Operator: _____ Date: _____

Reviewer: _____ Date: _____

