EPA DOCKET NO. A-98-49, II-A4-93

WASTE CHARACTERIZATION INSPECTION REPORT

EPA BASELINE INSPECTION NO. EPA-HAN-06.07-8 OF THE WASTE CHARACTERIZATION PROGRAM AT THE HANFORD SITE

June 4 –7 and 27, 2007

U.S. Environmental Protection Agency
Office of Radiation and Indoor Air
Center of Federal Regulations
1200 Pennsylvania Avenue, NW
Washington, DC 20460

December 2007

TABLE OF CONTENTS

ATTACHMENTS

1.0 EXECUTIVE SUMMARY

In accordance with 40 CFR 194.8(b), the U.S. Environmental Protection Agency (EPA or the Agency) conducted Baseline Inspection No. HAN-06.07-8, of the waste characterization (WC) program at the U.S. Department of Energy's (DOE) Hanford Site in Richland, Washington. This inspection occurred on June 4 through 7, 2007, with a follow-up onsite inspection on June 27, 2007. In accordance with the provisions of 40 CFR 194.8(b), as issued in a July 16, 2004, *Federal Register* (FR) notice (69 FR 42571–42583), EPA conducted a baseline inspection of the site's program to characterize wastes proposed for disposal at the Waste Isolation Pilot Plant (WIPP). As a result of this baseline inspection, EPA is proposing to approve the Hanford WC program based on a demonstration of the site's capabilities, with conditions and limitations discussed in this report, in accordance with 40 CFR 194.8(b).

EPA must verify compliance with 40 CFR 194.24 before waste may be disposed of at the WIPP, as specified in Condition 3 of the Agency's certification of WIPP's compliance with disposal regulations for transuranic (TRU) radioactive waste (63 FR 27354, 27405, May 18, 1998). EPA previously evaluated and approved WC systems at Hanford for characterizing TRU wastes in June 2005, and issued continued compliance approval in September 2005 (see A-98-49, II-A-58 in the EPA Air Docket). However, the current inspection served as the baseline inspection for the site as required by the changes to 40 CFR 194.8(b) to previously established inspection requirements. The purpose of this Hanford inspection was to evaluate the adequacy of the site's WC programs for two contact-handled (CH) TRU waste categories, debris (S5000) and solids (S3000), to be disposed of at the WIPP. During the inspections, the Agency examined the following activities:

- Acceptable knowledge (AK) for CH TRU debris waste (S5000) and solid waste (S3000) and AK for CH, repackaged debris waste (S5000) from the Plutonium Finishing Plant (PFP)
- Visual examination (VE) in lieu of real-time radiography (RTR) for CH TRU debris waste (S5000) and solid waste (S3000) and Visual Examination Technique (VET) for CH, repackaged debris waste from the PFP
- RTR for CH TRU debris waste (S5000) and solid waste (S3000)
- Nondestructive assay (NDA) systems at the Waste Receiving and Processing (WRAP) Facility for characterizing debris (S5000) and solid (S3000) wastes: the Super High Efficiency Neutron Counter A (SHENCA); the Pajarito Imaging Passive Active Neutron Units A and B (IPAN A and IPAN B); and the Gamma Energy Analysis Units A and B (GEA A and GEA B)
- NDA systems at the plutonium Finishing Plant (PFP) for characterizing debris waste (S5000): Calorimeters AR-1, AR-5, P-13, P-14 and Q-1 in conjunction with the Room 172 Segmented Gamma Scanner Assay System (SGSAS)
- WIPP Waste Information System (WWIS) for tracking the components of CH retrievably-stored TRU debris waste (S5000) and solid waste (S3000).

During the inspection Hanford personnel stated that load management will never be performed at the site and EPA did not evaluate this aspect during the inspection [see Section 8.1(5)]. Therefore, this proposed approval does not include load management for Hanford.

The EPA inspection team identified seven concerns, six of which required a response and one that did not require a response. EPA Inspection Issue Tracking Forms (see Attachments C.1 through C.8 to this report) document the concerns. Personnel from Hanford and the Carlsbad Field Office (CBFO) provided information to resolve these concerns to the EPA inspection team prior to the closeout of the onsite inspection and after the inspection. Hanford personnel also provided information relative to concerns from a previous Hanford inspection (see report for Inspection No. EPA-Hanford-05.06-08, June 2005, EPA Docket No. A-98-49, II-A4-58 and Attachment C.8 to this report). The information provided to EPA adequately addressed the concerns that required a response, the one concern that did not require a response and the concerns from the previous inspection. EPA considers all concerns to be resolved, and there are no open issues resulting from this inspection.

The EPA inspection team determined that the Hanford WC program for CH TRU waste was technically adequate. EPA is proposing to approve the Hanford CH TRU WC program in the configuration observed during this inspection and described in this report and the attached checklists (Attachments A.1 through A.9). This proposed approval includes the following:

(1) The AK process for CH TRU debris and solid wastes and for newly-generated debris wastes

(2) The WRAP SuperHENC A system for assaying solid and debris wastes

(3) The WRAP GEA Units A and B for assaying solid and debris wastes

(4) The WRAP IPAN Units A and B for assaying solid and debris waste

(5) The PFP Calorimeters AR-1, AR-5, P-13, P-14 and Q-1 in conjunction with the Room 172 SGSAS for assaying debris wastes

(6) The nondestructive examination (NDE) process of RTR for solid and debris wastes

(7) VE in lieu of the RTR process for retrievably-stored solid and debris wastes and VET of newly-generated debris wastes

(8) The WWIS process for tracking of waste contents of solid and debris wastes

Hanford must report and receive EPA approval of any Tier 1 (T1) changes to the Hanford WC activities from the date of the baseline inspection, and must notify EPA regarding Tier 2 (T2) changes according to Table 1, below. It is worth noting that Table 1 in this report closely follows the format used in the previous CH baseline approval report of Los Alamos National Laboratory-Central Characterization Project (LANL-CCP) (see EPA Docket No. A-98-49, II-A4-88). This format departs from what was used in baseline inspection reports and EPA site approval letters prior to LANL-CCP in several ways, as detailed in the LANL-CCP report and repeated here. The most important of these differences involves presentation of the T2 elements. In previous reports, there were two T2 columns that have been merged into a single T2 column for Hanford. The T2 column entries have also been modified to better reflect the

40 CFR 194.24 (h) requirements that the site provide notification regarding the completion or availability of specific T2 elements, whereas the previous tables stated that the site must actually provide the T2 elements (document or procedure revisions, etc.). This approach is similar to the tiering tables used in EPA reports for sites characterizing remote-handled TRU waste. Additionally, there are other minor word changes to the table for the sake of legibility.

The ***footnote in Table 1 specifies that "substantive changes" means changes with the potential to impact the site's waste characterization activities under 40 CFR 194.24 or documentation thereof, excluding changes that are solely related to Environmental Safety & Health (ES&H), nuclear safety, the Resource Conservation and Recovery Act (RCRA) or editorial in nature.

EPA will notify the public of the results of its evaluations of proposed T1 and T2 changes through postings to the EPA Web site and by sending e-mails to the WIPPNEWS list (see Section 2.0 of this report for a brief discussion of tiering). All T1 changes must be submitted for evaluation and approval by EPA prior to implementation. Upon approval, EPA will post the results of the evaluations through the EPA Web site and the WIPPNEWS list, as described above. Upon completion of its review of the T2 changes submitted at the end of each fiscal quarter, EPA will post the T2 changes. EPA expects the first report of Hanford's T2 changes at the end of the second quarter in FY2008.

The scope of the site baseline compliance decision is based on EPA's inspection completed on June 4-7 and 27, 2007.

Table 1. Tiering of TRU WC Processes Implemented by Hanford Based on June 4–7 and 27, 2007 On Site Baseline Inspection

WC Process Elements	Hanford WC T1 Changes	Hanford WC T2 Changes*
Acceptable Knowledge (AK) and Load Management	Implementation of load management; AK (5) New waste streams created as a result of combining or separating previously distinct waste streams; AK (6) Categories of waste not approved under this baseline inspection (e.g., soil/gravel, newly-generated solids including K Basin waste); AK (16)	Notification to EPA upon completion of AK Accuracy Reports; AK (2) Notification to EPA upon completion of updates to or substantive modifications**** of the following: - AK Summaries/Waste Stream Profile Forms (WSPFs) and AK Documentation Reports; AK (16) - AK-NDA Communication changes; AK (3) - Changes to site procedure WMP 400.7.1.9; AK (4) Notification to EPA upon generation of new WSPFs, AK summaries and AK documentation reports; AK (16)
Nondestructive Assay (NDA)	New equipment or physical modifications to approved equipment**; NDA (1)*** Extension or changes to approved calibration range for approved equipment; NDA (2)***	Notification to EPA upon completion of changes to software for approved equipment, operating range(s) and site procedures that require CBFO approval; NDA (2)***
Real-Time Radiography (RTR)	N/A	Notification to EPA upon the following: - Implementation of new equipment or substantive changes**** to approved equipment; RTR (1) - Completion of changes to site procedures requiring CBFO approval; RTR (2)
Visual Examination (VE) and Visual Examination Technique (VET)	N/A	Notification to EPA upon the following: - Completion of changes to site VE and VET procedures requiring CBFO approval; VE (1) and VET (1) - Addition of new Summary Category Group (SCG) or waste stream(s); VE (2) and VET (2)
WIPP Waste Information System (WWIS)	Implementation of load management; WWIS (4)	Notification to EPA upon the completion of changes to WWIS procedure(s) requiring CBFO approval; WWIS (1)

* Upon receiving EPA approval in this action, Hanford will report all T2 changes to EPA at the end of each fiscal year quarter.

** Modifications to approved equipment include all changes with the potential to affect NDA data relative to waste isolation and exclude minor changes, such as the addition of safety-related equipment.

*** These are discussed in Sections (1) and (2) of the section for each NDA system, i.e., 8.2.1 for WRAP GEA A &B, 8.2.2 for WRAP IPAN A & B, 8.2.3 for WRAP SHENCA and 8.2.4 for PFP Calorimeters and the Room 172 SGSAS.

****_Substantive changes_ means changes with the potential to impact the site's waste characterization activities or documentation thereof, excluding changes that are solely related to Environmental Safety & Health (ES&H), nuclear safety, the Resource Conservation and Recovery Act (RCRA) or are editorial in nature.

2.0 PURPOSE OF INSPECTIONS

On May 18, 1998, the U.S. Environmental Protection Agency (EPA or the Agency) certified that the Waste Isolation Pilot Plant (WIPP) will comply with the radioactive waste disposal regulations at 40 CFR Part 191. In this certification, EPA also included Condition 3, which states that "the Secretary shall not allow shipment of any waste from…any waste generator site other than LANL [Los Alamos National Laboratory] for disposal at the WIPP until the Agency has approved the processes for characterizing those waste streams for shipment using the process set forth in §194.8." The approval process described at 40 CFR 194.8 requires the U.S. Department of Energy (DOE) to (1) provide EPA with information on acceptable knowledge (AK)[1] for waste streams proposed for disposal at the WIPP, and (2) implement a system of controls used to confirm that the total amount of each waste component that will be emplaced in the WIPP will not exceed limits identified in the WIPP Compliance Certification Application (DOE/CAO 1996-2184, *40 CFR Part 191, Compliance Certification Application for the Waste Isolation Pilot Plant*, 1996).

The rule applying to this baseline inspection can be found in the FR (Vol. 69, No. 136, pp. 42571–42583, July 16, 2004). Under the changes to 40 CFR 194.8 promulgated in the July 16, 2004, FR notice, EPA must perform a single baseline inspection of a TRU waste generator site's WC program. The purpose of the baseline inspection is to approve the site's WC program based on a demonstration that the program's components, with applicable conditions and limitations, can adequately characterize TRU wastes and comply with the regulatory requirements imposed on TRU wastes destined for disposal at the WIPP. An EPA team conducts an onsite inspection to verify that the site's system of controls is technically adequate and properly implemented. Specifically, the EPA inspection team verifies compliance with 40 CFR 194.24I(4), which states the following:

> *Any compliance application shall: . . . Provide information which demonstrates that a system of controls has been and will continue to be implemented to confirm that the total amount of each waste component that will be emplaced in the disposal system will not exceed the upper limiting value or fall below the lower limiting value described in the introductory text of paragraph I of this section.*[2] *The system of controls shall include, but shall not be limited to: measurement; sampling; chain of custody records; record keeping systems; waste loading schemes used; and other documentation.*

In other words, the purpose of the baseline inspection is to assess whether DOE sites that characterize TRU waste prior to disposal at the WIPP are capable of characterizing and tracking

[1] As of the *Federal Register* notice of July 16, 2004 (69 FR 42571–42583), EPA has replaced the term "process knowledge" with "acceptable knowledge." Acceptable knowledge refers to any information about the process used to generate waste, material inputs to the process, and the time period during which the wastes were generated, as well as data resulting from the analysis of waste conducted prior to or separate from the waste certification process authorized by an EPA certification decision to show compliance with Condition 3 of the certification decision.

[2] The introductory text of 40 CFR 194.24(c) states, "For each waste component identified and assessed pursuant to [40 CFR 194.24(b)], the Department shall specify the limiting value (expressed as an upper or lower limit of mass, volume, curies, concentration, etc.), and the associated uncertainty (i.e., margin of error) for each limiting value, of the total inventory of such waste proposed for disposal in the disposal system."

the waste in such a manner that EPA is confident that the waste will not exceed the approved limits. Before proposing the approval of WC systems and processes at Hanford, EPA evaluated the capabilities of systems and processes to (1) identify and measure waste components (such as plutonium) that must be tracked for compliance,[3] and (2) confirm that the waste in any given container has been properly identified as belonging to the group of approved waste streams.

Following EPA's approval of the WC processes evaluated during the baseline inspection, EPA is authorized to evaluate and approve, if necessary, changes to the site's approved WC program by conducting additional inspections under the authority of 40 CFR 194.24(h). Under 40 CFR 194.24, EPA has the authority to conduct continued compliance inspections to verify that the site continues to use only the approved WC processes to characterize the waste and remains in compliance with all regulatory requirements. Based on the adequacies of the WC processes demonstrated during the baseline inspection, including all conditions and limitations, EPA will specify which subsequent WC program changes or modifications must undergo further EPA inspection or approval under 40 CFR 194.24. EPA will accomplish this by assigning a tier level to each aspect of the characterization program.

T1 activities have more stringent reporting requirements and require DOE to notify EPA and receive the Agency's approval prior to implementing the change. DOE will report T2 activities to EPA based on the frequency established in the inspection report. DOE may choose to characterize and dispose of materials at its own risk while EPA considers the proposed T2 changes. If Hanford contemplates a change that is not identified in this report, EPA recommends that the site, in consultation with the Carlsbad Field Office (CBFO), discuss the nature of the change with EPA. This would minimize the possibility of EPA not approving the site-assigned tiers.

3.0 PURPOSE OF THIS REPORT

This report documents the basis for EPA's approval decision and explains the results of EPA Baseline Inspection No. HAN-06.7-8 in terms of findings and concerns. Specifically, this report does the following:

- Describes the characterization systems evaluated during the inspection that are proposed for approval
- Provides objective evidence of the approval basis for all WC systems
- Identifies all relevant system limitations and/or conditions for each WC system
- Identifies the applicable T1 and T2 elements

[3] The potential contents of a waste stream or group of waste streams determine which processes can adequately characterize the waste. For example, if AK information suggests that the waste form is heterogeneous, the site should select a NDA technique that suits such waste to ensure adequate measurements. Radiography and VE) help both to confirm and quantify waste components, such as cellulosics, rubbers, plastics, and metals. Once the nature of the waste has been confirmed, the assay techniques then quantify selected radionuclides in the waste. In some cases, a TRU waste generator site may be able to characterize a wide range of heterogeneous waste streams or only a few. A site's stated limits on the applicability of proposed WC processes govern EPA's inspection scope.

- Provides objective evidence of outstanding findings or concerns in the form of documentation, as applicable
- Describes any tests or demonstrations completed during the course of the inspection and their relevance to EPA's approval decision

The completed checklists (Attachments A.1 through A.9 to this report) reference the documents that the EPA inspection team reviewed in support of the technical determination. To see or obtain copies of any items identified in the attached checklists, write to the following address:

Quality Assurance Manager
USDOE/Carlsbad Field Office
P.O. Box 3090
Carlsbad, NM 88221

EPA's final approval decision on the Hanford WC program is conveyed to DOE separately by letter. More information is also on EPA's Web site at http://www.epa.gov/radiation/WIPP/index.html, in accordance with 40 CFR 194.8(b)(3).

4.0 SCOPE OF INSPECTION

The scope of EPA Baseline Inspection No. HAN-06.07-8 included the technical adequacy of the WC systems in use at Hanford to characterize TRU wastes. The EPA inspection team evaluated these systems with respect to their ability to perform the following functions:

- Identify and quantify the activities of the 10 WIPP-tracked radionuclides (^{241}Am, ^{137}Cs, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{90}Sr, ^{233}U, ^{234}U, and ^{238}U) using a combination of AK and NDA systems
- Assign waste material parameters (WMPs) correctly using RTR and VE for CH retrievably-stored solid and debris waste, and VET for newly-generated debris wastes from the PFP
- Perform effective waste information (data) transfer using the WWIS

Specifically, these systems consisted of the following components:

- AK process that supports retrievably-stored S3000 solid and S5000 debris wastes, and newly-generated S5000 debris wastes
- Five NDA systems located within or in close proximity to the WRAP Facility—the SuperHENC A, GEA Units A and B, and IPAN Units A and B, as described in the attachments to this report—for the analysis of CH retrievably-stored S3000 solid and S5000 debris wastes, and five NDA systems at the PFP—Calorimeters AR-1, AR-5, P-1, P-14 and P-15 supported by the Room 170 SGSAS, as described in the attachments to this report—for the analysis of CH retrievably-stored S5000 debris wastes
- VE in lieu of RTR for retrievably-stored S3000 solid wastes and S5000 debris wastes

- VET of newly-generated S5000 debris waste from the PFP
- The WWIS for the purpose of data transfer for waste components of all waste containers destined for WIPP emplacement

During an inspection, EPA does not approve characterization data; that function is the sole responsibility of the site being evaluated, in this case, Hanford. EPA evaluated the site's WC processes to characterize CH retrievably-stored debris and newly-generated TRU debris wastes. The evaluation consisted of interviewing personnel, observing equipment operations that comport with the site procedures, and inspecting records related to each of the WC processes within the inspection's scope. An important aspect of this evaluation was the objective evidence documenting the effectiveness of the WC processes. Objective evidence typically takes the form of batch data reports (BDRs); Radioassay Data Sheets; AK accuracy reports; VE and RTR tapes; VET records from two-person examinations; and WWIS printouts for specific TRU containers. During this inspection, EPA selected samples of each of these items, based on the number and variety of items each WC process produced, consistent with standard auditing techniques. For example, the sample of NDA BDRs that the EPA inspectors evaluated to verify Hanford's compliance included examples from all operating systems, and were representative of all pertinent waste matrices and spanned each system's operating range to the extent possible. Based on the evaluation of the WC processes in conjunction with the sample of objective evidence, EPA determined the technical adequacy of the WC processes within the inspection's scope.

5.0 INSPECTION-RELATED DEFINITIONS

During an inspection, EPA inspectors may encounter items or activities that require further inquiry for their potential to adversely affect WC and/or isolation within the repository. The two main categories relevant to WC inspections are identified below:

Finding: A determination that a specific item or activity does not conform to 40 CFR 194.24(c)(4). A finding requires a response from CBFO.

Concern: A judgment that a specific item or activity may or may not have a negative effect on compliance and, depending on the magnitude of the issue, may or may not require a response.

Note that DOE does not need to address concerns not requiring a response prior to program approval. However, EPA recommends that when DOE accepts the site's response to an EPA concern, it should inform EPA at the same time that the site implements the corresponding corrective action. This process is similar to what is used for a T2 issue.

6.0 PERSONNEL

6.1 EPA Inspection Team

Table 2 identifies the members of the EPA WC inspection team.

Table 2. EPA Inspection Team Members

Inspection Team Member	Position	Affiliation
Ed Feltcorn	Inspection Team Leader	U.S. EPA ORIA
Rajani Joglekar	Inspector	U.S. EPA ORIA
Juan Reyes	Inspector	U.S. EPA ORIA
Connie Walker	Inspector	S. Cohen & Associates, Inc.
Dorothy Gill	Inspector	S. Cohen & Associates, Inc.
Patrick Kelly	Inspector	S. Cohen & Associates, Inc.

6.2 Personnel Contacted

EPA and its support personnel conducted interviews with Hanford WC personnel in several disciplines. The personnel contacted represented only a sample of the CH TRU WC staff, and they are listed in the Table 3, along with their affiliations and areas of expertise.

Table 3. Personnel Contacted During Inspection

Personnel	Affiliation	Area of Expertise/Function
Molly Anderson	Hanford	AK Expert (AKE)
Scott Bisping	Hanford	AKE
Dan Arrenholz	Hanford	AKE
Dalena Rollosson	Hanford	AKE
Debbie Thomas	Hanford	Training
Karl Husted	Hanford	WRAP NDA
Rick Dunn	Hanford	TRU Waste Site Project Manager
Kent McDonald	Hanford	APL Projects Contract STR
Naeem Abdurrahman	Hanford	WRAP NDA
Brian Anderson	Hanford	WRAP NDA
Jay Botemus	Hanford	WRAP NDA
Eric Greager	Hanford	WRAP & PFP, NDA & VET
Michelle Cameron	MCS	PFP NDA
Bruce Gillespie	MCS	PFP NDA
George Westik	MCS	PFP NDA
Sheila Hailey	Hanford	WRAP RTRWCO, SPM
Aaron Anderson	Hanford	WRAP RTR Operator/ITR
John Keve	Hanford	WRAP RTR SME
Frank Bolson	Hanford	WRAP RTR Operator/ITR
M. Casto	Hanford	WRAP RTR Operator/ITR
Jock Thompson	WRAP Facility	Visual Examination Expert
Ken Svoboda	Hanford	WWIS, WCO
Karola Kover	Hanford	WWIS, WCO
Debbie Thomas	TRU Training	WWIS, Training Administrator

Table 3. Personnel Contacted During Inspection

Personnel	Affiliation	Area of Expertise/Function
Barbara Woodford	Hanford	NCO
Linda Phillips	Hanford	NCO
Caroline Sutter	Hanford	SPM
Peggy Bratcher	Hanford	NCO
Pam Johnson	Hanford	NCO
Tony Clark	Hanford	NCO
Scott Harder	Hanford	NCO
Mike Esparza	Hanford	NCO
Catherine Clements	Hanford	NCO

During the baseline inspection, Hanford provided a list of TRU WC personnel from which EPA selected a sample of individuals to be interviewed. The EPA inspectors reviewed the qualifications (including WC experience) and training records of these individuals to assess their WC capabilities. Based on this evaluation, EPA determined that Hanford WC personnel responsible for characterizing and certifying TRU waste were qualified and had received adequate training to perform their assigned function. When personnel changes occur, EPA may request qualification and training records of any new individuals identified as key WC personnel. EPA will review these records and may interview the personnel to determine their ability to produce quality data. This personnel qualification evaluation and review of training records is similar to the EPA's evaluation during each inspection.

7.0 PERFORMANCE OF THE INSPECTION

7.1 Site Background and History

The DOE's Hanford site covers a 560-square mile area on the Columbia River near Richland, Washington. The Hanford site was established during World War II to produce plutonium for U.S. nuclear weapons and the site's nine production reactors created approximately seventy five percent of the plutonium used in the U.S. nuclear arsenal. Peak plutonium production years were in the 1960s and all nuclear material production was halted in late 1989. Hanford's current mission involves environmental restoration and nuclear material stabilization and stewardship. Hanford is also an interim storage facility for TRU-contaminated waste, including defense waste.

7.2 Inspection Process Overview

EPA Baseline Inspection No. HAN-06.07-8 took place on June 4 - 7, 2007. EPA conducted one follow-up inspection on June 27, 2007, to complete its evaluation of the VET operation within the PFP. EPA performed both aspects of this inspection in accordance with the scope described in Section 4.0 of this report for the purpose of determining compliance of the site's WC program with 40 CFR 194.24. The inspection involved the following steps:

(1) Preparing draft checklists specific to each technical area before the inspection

(2) Reviewing the results of EPA's and CBFO's previous inspections and audits of the Hanford WC program, including findings and concerns previously identified by EPA and/or CBFO and corrective actions

(3) Obtaining and reviewing site procedures, reports, and other technical information related to WC activities at Hanford in advance of the inspection

(4) Interacting with CBFO and Hanford personnel to arrange inspection logistics

(5) Verifying onsite the technical adequacy or qualifications of WC personnel, procedures, processes, and equipment by means of interviews, observation, and demonstrations, and recording the results on checklists

(6) Recording all concerns on EPA Inspection Issue Tracking Forms and providing completed forms to CBFO and site personnel as they were generated

(7) Communicating all pertinent information to CBFO and Hanford personnel onsite, as appropriate

(8) Pursuing resolution of all identified issues before completion of the inspection by discussions with CBFO and Hanford personnel

(9) Conducting entrance, exit, and daily briefings for CBFO and Hanford management personnel, as appropriate

8.0 TECHNICAL WASTE CHARACTERIZATION AREAS

Sections 8.1 through 8.4 of this report detail the four technical areas assessed during this inspection:

- AK
- NDA
- NDE, consisting of VE, VET and RTR
- WWIS

8.1 Acceptable Knowledge

EPA examined the AK process and associated information to determine whether Hanford demonstrated compliance with 40 CFR 194.8 requirements for CH retrievably-stored solid and debris wastes, and newly-generated debris wastes.

WC Element Description

As part of the inspection, EPA reviewed the following elements of the AK process:

- Overall procedural technical sufficiency and scope and ability to follow the AK WC process for containers and waste stream
- Waste-generating procedures, processes, and documentation

- Characterization of required waste material parameters (WMPs) and radionuclides
- AK information assembly and compilation
- AK confirmation and associated discrepancy resolution
- Sufficiency of AK characterization results
- Assembly of required information and use of supplemental information
- AK summary preparation
- Reassignment of waste stream due to AK and discrepancy analysis
- AK accuracy

Attachment A.1 to this report identifies objective evidence reviewed by the EPA inspection team. AK provides information on several aspects of TRU wastes at Hanford, including but not limited to the following:

- Defense waste status
- Material parameters
- Waste stream
- Radionuclide composition
- Waste matrix codes (WMCs)

Documents Reviewed

During the inspection, EPA inspectors examined or accepted a variety of documents related to AK, some provided as paper copies and in electronic format. The list of all documents reviewed or accepted as objective evidence is presented below.

General References

- WM-400, Acceptable Knowledge Documentation Management, Revisions 20 and 21, Section 7.1.9, May 7, 2007
- WIPP Waste Stream Profile Form/AK Summary for Waste Stream RLM233SD.001, dated November 9, 2006
- WIPP Waste Stream Profile Form/AK Summary for Waste Stream RLVIPAC.001, July 21, 2006
- WIPP Waste Stream Profile Form/AK Summary for Waste Stream RLRFETS.001, July 12, 2004
- HNF-30266, Revision 21, 6/7/07, Waste Stream RLM233SD, AK Documentation Report, May 7, 2007

- HNF-29578, Revision 1, 6/7/07, Waste Stream RLVIPAC, AK Documentation Report, May 7, 2006
- HNF-30022, Revision 1, Waste Stream RLRFETS, AK Documentation Report, December, 2006
- Training records for Naeem Abdurrahman, Karl Husted, Molly Anderson, Dalena Rollosson, Scott Bisping, Personnel Classification Detail Printed June 5, 2007
- TRU-SPO-11.9-05302007734551, Acceptable Knowledge Performance Report for 1575 Containers TRU Project Waste form Waste Streams KEBASIN01, RLVIPAC, RLMCFFD, RLMPFPD, RLMPUEXD, RLCBWD, RLETECD, RLM231ZD, RLM233SD, RLM300D, RLM308D, RLM325D, RLMGVALD, RLMWARD, RLSWOCD, prepared by Molly Anderson, May 16, 2007
- Container Data Reports/print outs, Containers 0011813-0012639, printed May 6, 2007
- WMP-400, TRU Waste Visual Examination Technique, Revision 8, Section 7.1.10, February 28, 2007
- TRU SPO-11.4.4 0418200729491, Acceptable Knowledge Re-evaluation Checklist for addition of PCB Items and Waste Material Weight Parameters Weight Estimates, Molly Anderson, April 9, 2007
- Email Records (number yet to be reassigned) May 13, 2007 through March 19, 2007
- WMP Training Bulleting, Hanford GE-Vallecitos Mixed Debris Waste Stream RLMGEVALD, Bulletin Number TB-T-003, Revision 0, February 7, 2007
- TRU-SPO-11.9-03282200539609, Acceptable Knowledge Source Document Discrepancy Resolution Waste Matrix Code for Kerr McGee D&D, Dan Arrenholz, June 16, 2005
- TRU-SPO-11.4.1-0522200136372, Occurrence and Source of Cs-137 and K-40 in Transuranic Waste, Michale Cantaloub, WRAP NDA Cognizant Engineer, February 20, 2001
- TRU-SPO-11.9-0429200249268, Sr-90 to Cs-137 Ratio for Appendix E of Hanford Site Transuranic Waste Certification Plan for NDA, Memorandum MT400-PJC-02-076 to P.J. Crane from R. Clinton, April 11, 2002
- MT400-PJC-02-077, ^{234}U to ^{235}U and ^{234}U to ^{238}U Ratios for Appendix E of Hanford Site Transuranic Waste Certification Plan for NDA, to P.J. Crane from R. Clinton, April 11, 2002
- WRP1-OP-0908, Operation of the Drum Nondestructive Examination System, Revision I, Change 9, December 28, 2006
- TRU Nonconformance Report, WR-TB-2006-470, Misidentification of SWCG by AK, Does Not Match Waste Stream, RLM233SD Waste Stream, January 3, 2007
- Course No.300920, Acceptable Knowledge Documentation Management Training, July 2005
- WMP Training Bulletin Hanford GE-Vallecitos Mixed Debris Waste Stream RLMGEVALD, Training Bulletin TR-T-07-003, February 2007

Waste Stream RLM233SD.001 References

- TRU-WST-11.4.3-0410200659629, Project Experience Report, Demolition of Hanford's 233-S Facility, G. T Berlin and T. K. Orgill, Fluor Hanford, July 2004
- TRU-WST-11.4.4-0306200653337, Solid Waste Burial Records for 233-S, Rockwell Hanford Operations, N/A
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The Batch Data Reports (BDRs) examined during this inspection are shown in Table 4.

Table 4. Batch Data Reports Examined

Container Number	VE/VET BDR No.	RTR BDR No.	NDA BDR No.
VIPAC:0023117	PFP-VE-2006-028	N/A	TRU-WRP-11.1.9-0601200654381, WR-TB-2006-176
VIPAC:0023182	PFP-VE-2006-027	N/A	11.19-0522200633466. WR-TB-2006-156 SWB
233SD:002873	N/A	WR-TB-2006-171	WR-TB-2006-172
233SD:0011764	N/A	WR-TB-2006-203	WR-TB-2006-204
RFETS:RHZ-221-31628	PFP-VE-2003-033	N/A	TRU-PFP-11.1.6-1209200355201; PFP-TB-2003-182 (billet can)
RFETS:RHZ-221-31639	PFP-VE-2003-033	N/A	TRU-PFP-1.1.6-1031200353668; PFP-TB-2003-182 (billet can)

Technical Evaluation

The EPA inspection team selected three waste streams as a representative sample for evaluating the three waste types evaluated, as follows:

- Newly-generated debris - waste stream RLVIPAC.001 is composed of fuel assemblies that were designated as waste in 2006
- Retrievably-stored debris - waste Stream RLM233SD.001 is composed of decontamination and decommissioning (D&D) waste generated up through 1994

- Retrievably-stored solids - waste stream RFETS01 consists of ash from the Rocky Flats Plant (RFP) and is a solid retrievably-stored waste stream[4]

EPA evaluated the adequacy of AK information specific to each of these CH TRU retrievably-stored debris and solid wastes in the following areas:

(1) Data management was evaluated.

Hanford used several databases to obtain and document AK information. Hanford AKEs stated that the Transuranic Waste Baseline Inventory Report serves as one initial source of information regarding waste stream designation and assignment. Based on this assignment, Hanford site representatives examined existing databases for information concerning the streams. The site's Solid Waste Information Transfer System (SWITS) was also a primary source of information; this system includes, for example, original generator records and was used to obtain information about the drums, including radionuclide content (as available).

The WRAP's Data Management System served as another source of information. AK information obtained from these and other sources was documented on Acceptable Knowledge Source Document Reference Lists (Attachment 1 of WMP 400 7.1.9) that are attached to each AK Summary. Each AK source document was assigned a unique number by document generation date. Hanford personnel stated that AK data is eventually transferred to the Records Management Information System (RMIS), which was being replaced by the Integrated Document Management System (IDMS).

Hanford's approach was to create two documents that contain required AK information: the AK Documentation Report addressed AK requirements and included detailed process information; the AK Summary was attached to the Waste Stream Profile Form and provided a detailed synopsis of the contents of both the AK Documentation Report and the AK Summary. Note that the site chose to assign a unique number to each reference cited in the AK Documentation Report, but used a different number in the AK Summaries to identify the same reference. EPA recommends the site assign the same numbers to identify documents in both AK Summaries and AK Documentation Reports, which will minimize confusion and make information consistent.

Procedure WMP 400 7.1.9 required that a spreadsheet be developed to track waste characterization status for containers in the characterization process. The procedure required that the spreadsheet include the following:

- Container ID
- Waste Stream ID
- Repacked From Container ID
- Overpacked Into
- NCRs/Corrective Action Reports
- Generation Date/Closure Date

[4] EPA has examined this stream at several previous inspections, most recently during EPA-Hanford-05.06-08, Docket No. A-98-49, II-A4-58, in June 2005.

Waste characterization data is managed using the Hanford Electronic Data Management Tool. This is an Excel©-based data management system that cataloged the status of each characterization effort associated with drums as they are characterized, and includes BDR number, detailed BDR characterization information, Site Project Officer signature status, waste stream designation and other information. The system captured the necessary information, but its operability may be hampered once both the WRAP and PFP NDA and NDE systems are fully operational.

(2) AK accuracy was assessed.

Site representatives provided the May 16, 2007, Acceptable Knowledge Performance Report for 1575 containers, including containers from the RLVIPAC.001 and RLM233SD.001 waste streams. The AK accuracy report calculated the percent of waste streams requiring reassignment to a new waste stream based on waste matrix code changes, as well as the percent of containers that were inconsistent with the anticipated radionuclide composition as predicted by AK. The report documents each of these aspect for every waste stream, and showed that for the RLM233SD waste stream, 55% accuracy was noted with respect to identification of waste matrix codes using AK and that 45% of the containers that AK had identified as debris were in fact solids and had to be reassigned to a separate waste stream. When asked about this, the AKE stated that the program did not perform QuickScan or other screening methods to assess containers prior to conducting RTR on the stream. This screening was not done even though the site suspected containers may fall outside of the specified stream because it had been determined it necessary to perform NDA on containers within a specified time frame, regardless of whether these containers ultimately belonged in the waste stream.

It was noted that the physical description of the stream was based on AK, and that recalculation of the physical characteristics of waste stream RLM233SD.001 was not performed, excluding the containers that were determined to have faulty AK. The AKE performed this recalculation and determined that the WMP percentages in the AK Summary and AK Document Report for RLM233SD were still representative of the stream as a whole, even when the faulty containers were removed from the calculation. EPA recommended that the site reevaluate the AK for this inaccuracy, and Hanford personnel stated this will be performed in the future. Providing notification to EPA upon completion of the reevaluation of this waste stream and the revised AK Accuracy Report or other related memoranda for this waste stream is necessary as a T2 change. Consistent with EPA's authority under 40 CFR 194.24(h), EPA may request this information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.)

(3) NDA-AK communication was assessed.

AK-NDA communication is formally implemented at all TRU WC sites to ensure appropriate use of AK data. Hanford requires that all NDA personnel be trained as AK Data Collectors, so all NDA personnel understand how to assemble AK and provide any new data they might find to supplement the AK record. NDA personnel are required to read the AK Training Bulletin for each waste stream that presents a summary of AK-derived radiological information. AK-NDA

communications occur through regular meetings, emails, and phone calls. The Vallecitos Waste Stream Record of e-mail Communications and Training Bulletin was provided as objective evidence of Hanford's approach to documenting AK-NDA communication.

The process used by Hanford effectively implements AK-NDA communication. However, because the process was not formalized in a written instruction or procedure, there was no assurance that the observed activities would continue. This concern was discussed with Hanford AK personnel and EPA included it on an EPA Inspection Issue Tracking Form (See Attachment C.1 of this report for a copy of this form) and is discussed below.

EPA Inspection Issue Tracking Form, Issue No. HAN-AK-07-001CR: AK information is interpreted by AKEs and is transmitted to NDA personnel through waste stream-specific training memoranda, AK document training (e.g., SWITS database), and informal meetings. The process implemented, as determined through interview, is effective and supports AK-NDA personnel communication. There are 7 AKEs and numerous AK data collectors and NDA personnel. Accordingly, the process observed should be formalized by incorporation of a written procedure or instruction which is necessary to cover the numerous individuals involved with the process, as well as to ensure process continuance in the event of personnel changes.

Resolution: Hanford representatives responded by revising WMP 400 7.1.9 to state, in Section 4.4.22:

> *Communicate radionuclide characterization information to NDA personnel via training bulletin, e-mail, or other method to ensure and facilitate awareness of radionuclide presence, isotopic ratios (if available), and limitations associated with the radionuclide AK information. Any information generated as a result of this communication, and any ongoing communication, will be added to the AK documentation for the waste stream.*

Status of Concern: The response is complete and adequate. It mandates communication including training bulletins, and that this information is placed in the AK documentation record to ensure that the communication is not only performed, but is documented. EPA accepts the resolution and considers the issue closed.

Any updates to or substantive modifications of the AK-NDA communication process is a T2 change, and EPA must be notified of the change. Consistent with EPA's authority under 40 CFR 194.24(h), EPA may request information supporting this change if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.)

(4) AK procedural adequacy was assessed.

The AK Procedure WMP 400 7.1.9, Revision 20, was significantly changed in comparison to Revision 17 which was the version last examined by EPA in 2005. For example, while the procedure still includes some common elements (e.g., AK Document Management, Compiling AK Information), additional sections or modifications to sections have been made, including, but not limited to, sections dealing with Recording AK Documentation, Reviewing the AK

Documentation, Generating an AK Summary Report, Determining AK Documentation Accuracy, Re-evaluating AK Documentation, AK Sufficiency Determination Resolving AK Information Discrepancies, Updated AK for Additional Waste Stream Containers, Container Tracking Spreadsheet Development, and Container Tracking Maintenance. The procedure also now includes a few additional attachments (e.g., AK Documentation Report preparation).

Many of the changes were made to address NMED Waste Analysis Plan requirements and included some elements and components common to the CCP program. EPA does not have a mandated format or content for the AK procedure, but requires that the document adequately express AK elements sufficient to address commitments made in the Compliance Recertification Application and Compliance Certification Application, as well as those necessary to meet requirements of 40 CFR 194.24. Short of the modification made in item (3) above, EPA found that the general procedure was adequate. Because WMP 400 7.1.9 is a key component of the AK process, substantive modification of any AK procedure is considered a T2 change and EPA must be notified of this change. Consistent with EPA's authority under 40 CFR 194.24(h), EPA may request this information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.)

(5) Load management was examined.

During the inspection the AKE indicated that load management will not be performed at the site because the site has a low-level waste disposal facility available onsite for any low-level components. EPA did not evaluate load management during the inspection. Implementation of load management would be considered a T1 change. (See Table 1 where this is included as a T1 change.)

(6) The definition of waste stream was evaluated.

The Waste Acceptance Criteria and WAP define a waste stream as "waste material generated from a single process or from an activity which is similar in material, physical form, and hazardous constituents." The RLVIPAC waste stream was a distinct population of waste assemblies used in experimentation with distinct physical form, radiological content, and material characteristics. The assemblies required precise construction for testing purposes, and the stream had been narrowly and appropriately defined with respect to dates of generation, radiological content, etc. The RLM233SD waste stream is a decontamination and decommissioning (D&D) waste stream created in two different time periods (1979-1981 and 1990-1994); the D&D activity was for the same building/area. When asked why the process took place in two phases, the AKE indicated that programmatic budgetary constraints ceased initial D&D activities, so there is no physical or material differentiation of the waste stream based on time periods. RLM233SD did, however, include several containers identified through RTR as containing >50% sludge, requiring the drums to be reassigned to an S3000 stream (AK Summary and other documentation for this stream have yet to be assembled).

The NCR process documented this discrepancy, and the process was effective at removing containers from the stream. Therefore, the two waste streams examined during the inspection were appropriately defined. Note that the definition of waste stream is a very important aspect of

the AK process because it provides the fundamental waste grouping that is characterized. Incorrectly identified waste streams will result in inaccurate data categorization and potential errors in waste characterization. Therefore, EPA needs to be notified of new waste streams created as a result of combining or separating previously distinct waste streams prior to their disposal. This is a T1 change. (See Table 1 where this is included as a T1 change.)

(7) The use of QuickScan was examined.

Hanford employs procedure WRP1-OP-0908 Rev I, Change 9 that implements a QuickScan of each drum using an RTR unit to verify the waste form and presence/absence of liquids. EPA considers this to be a characterization approach that is a process rather than administrative control,which is subject to inspection. Hanford should ensure that QuickScan records are referenced and available as part of the AK Record.

(8) Staff training was examined.

Training records for the following staff were evaluated:

- Naeem Abdurrahman (AK Data Collector)
- Karl Husted (AK Data Collector)
- Molly Anderson (AK Expert)
- Dalena Rollosson (AK Expert)
- Scott Bisping (AK Expert)
- Rick Dunn (SPM)

The AKEs are responsible for creating Training Bulletins (e.g., TB-T-03-001) for each waste stream and the AK Data Collectors must read each Training Bulletin. With regard to WIPP training, Training Program 300921B addressed general WIPP requirements, but made no mention of compliance with EPA requirements. Training does include federal and/or state RCRA regulations, as well as the site-specific AK procedure WMP 400 7.1.9. Much of the training pertinent to AK was accomplished via On-the-Job-Training (OJT), and non-documented training pertaining to database and AK Source Document generation was provided. EPA recommends that the formal WIPP training include a section specific to EPA requirements and regulations, and that OJT requirements pertaining to database use and other elements be better documented in the individual training records.

(9) Drum traceability was assessed, as well as the ability to follow the AK WC process for containers and waste streams that were evaluated.

Several containers were selected to assess drum traceability: RLVIPAC:0023117, RLVIPAC:0023182, 233SD:002873, 233SD:0011764, RFETS:RHZ-221-31628, RFETS:RHZ-221-31639. In addition, two 1979-1981 time frame drums from waste stream RL233SD (D79-10A43 and UC-808-7) were selected for traceability to original records, even though the drums had not undergone characterization to determine whether records for these containers differed than those for containers from the same stream generated in the early 1990s time frame. Hanford representatives were asked to obtain the SWITS and/or RMIS data sheets pertaining to these

containers. For each container, some types of historic records such as a Facility Material Records (for the RLVIPAC waste stream), Solid Waste Disposal Records or ERC Waste Inventory Sheets were identified and these provided general radiological and/or physical data.

The VIPAC waste stream includes several individual "pins" or experimental assemblies, and the AK Summary implies that each pin has a unique, traceable radiological signature that can be traced back to the original assembly data. To evaluate this, the EPA inspection team asked the AKE to find individual assembly data for the following items: assemblies AD84, AB98, and AA in drum 23117; and assemblies AE03, AF97 and AC47 in drum 23182. This traceability analysis revealed that individual assembly data were not available, and that instead, generalized assembly "groupings" were identified with an overall radiological signature, and information regarding these groupings information was included in the AK Record.

In their capacity as AK Data Collectors, NDA personnel have direct access to SWITS and other AK data sources and they may use this as part of the characterization process, for more information, see Non Destructive Assay, Section 8.2. The assessment of traceability performed during the inspection ensures that AK and NDA personnel have access to the same information, and that both use the same data to compile AK summaries and documentation reports or to support NDA as part of the NDA analysis.

(10) Limitations and exclusions associated with the AK record were assessed.

Every AK Source Document has an associated Attachment 3-Record of Communication that includes an area to list or identify AK data limitations. Each of the examples provided either listed a limitation or stated that there were no limitations.

(11) Discrepancy resolution (AK-AK) was examined.

Source Document TRU-SPO-11.9-0328200539609 documents an AK-AK data discrepancy pertinent to Kerr-McGee waste. In the example provided, the waste matrix code and waste matrix code group for the subject stream in the Draft Revision 1 AK Document (reference U001) do not agree with the Waste Matrix Code (WMC) identified through examination of Waste Disposal Records. A reevaluation was performed whereby the WMC S5420 was then assigned to the waste instead of WMC S5110 (metal debris), and a WMC assignment of Heterogeneous Debris was also made. The document provided a sufficiently detailed explanation of the issue identified and issue's resolution, thus demonstrating the sites ability to document AK-AK discrepancies and to resolve those discrepancies.

(12) Defense origin of waste was examined.

As indicated above, three waste streams—RLVIPAC.001, RLM233SD.001, and RLFETS.001—were evaluated during the inspection. Of these, the defense origin for RLFETS.001, an ash stream originating from RFP containing nearly exclusively weapons grade plutonium (WG Pu), was previously assessed by EPA and found to be satisfactory[5]. RLVIPAC.001 is described as

[5] EPA examined this waste stream during several previous inspections, most recently in June 2005, during Inspection No. EPA-Hanford-05.06-08, see Docket No. A-98-49, II-A4-58.

consisting of defense nuclear waste and materials generated through by-product management, stating that the RLVIPAC mixed oxide (MOX) "pins" were for defense purposes as well as defense-related research and development. While the "pins" (assemblies) may have been used for non-defense purposes, the site indicated that tracking individual pin "use" was not possible.

The MOX material in the pins included plutonium that the site indicated was originally destined for WG Pu production, thus indicating an original defense intent for the plutonium in the MOX. With respect to RLM233SD.001, Hanford indicated that AK documentation shows the plutonium nitrate processed in building 233-S was derived through defense-related plutonium activities (e.g., reduction-oxidation processing or REDOX). The purpose of building 233-S activities was to concentrate the nitrate solutions that were then sent to PFP for further processing. Therefore, any debris generated through D&D of the 233-S building and related cells would be contaminated only with defense-derived materials. Hanford's arguments were reasonable, considering that EPA does not perform a detailed and thorough analysis of a waste stream's defense status.

(13) AK information pertaining to radiological characteristics of waste was examined.

Each of the three waste stream's AK data was examined to assess whether the AK information summarized in the AK documentation reports and AK summaries were adequate [see (16), below, for additional discussion pertaining to AK summaries and AK documentation reports)]. EPA examined select references to verify information presented in the AK summaries and AK documentation reports and a summary of EPA's review is presented below.

RFETS waste was composed primarily of WG Pu and fuel grade plutonium, ^{241}Am, ^{237}Np, ^{233}U, and depleted and enriched uranium, with the two most prevalent isotopes being ^{239}Pu and ^{240}Pu. The radionuclide scaling factors in use were based on a "known relationship" between ^{235}U and ^{234}U and ^{238}U and ^{234}U, such that the ^{234}U/^{235}U ratio is approximately 30, and the ^{234}U/^{238}U ratio is approximately two. EPA questioned the use of Hanford-based scaling factors on RFETS-generated waste; see Item (15), below, for additional discussion.

The AK documentation report states that the fuel assemblies in the RLVIPAC waste stream are composed primarily of mixed plutonium and natural uranium oxides (MOX); each assembly contained approximately 1182 grams of MOX powder that had an average of 20.17 g plutonium and 970.3 g of uranium. AK documentation also stated that the "approximate plutonium isotopics are: ^{238}Pu- 0.009 percent; ^{239}Pu - 91.84 percent; ^{2340}Pu - 7.76 percent; ^{241}Pu - 0.37 percent; and ^{242}Pu - 0.028 percent…" the "approximate isotopic breakdown of natural uranium is: ^{238}U – 99.28305 percent; ^{235}U – 0.711 percent; ^{234}U – 0.0054 percent." AK analysis indicated that this ratio more closely approximates a weapons grade ^{239}Pu/ ^{240}Pu ratio, where these two radionuclides are the most prevalent isotopes. The AK Document indicated that trace amounts of ^{241}Am, ^{237}Np and ^{137}Cs may be present. The same scaling factors used on RFETS waste for ^{234}U/^{235}U, ^{234}U/^{238}U, and ^{137}Cs/^{90}Sr were used for this waste; applicability of the scaling factors is better than for RFETS waste since the scaling factors are apparently based on Hanford-generated waste. EPA examination of select documentation including BDRs, as well as AK source documents, verifies this analysis. EPA found that the AK Documentation Report for this stream

lacked uranium isotopic information, and the report was modified during the inspection to correct this omission [see Item (16), below].

The RLMD233SD.001 waste stream was composed of D&D material from the 233-S building that concentrated plutonium oxides from REDOX for subsequent transfer to PFP for processing. To assess the radiological content, the AKE examined the Master Documented Safety Analysis (MDSA) and a demolition report for the 233-S Facility to obtain preliminary isotopics, which was later verified through examination of burial records for individual containers. These data suggested that the waste was composed of 6%-10.5% ^{240}Pu. These values were decay (ingrowth) corrected approximately 39 years to 2006, so "significant quantities of ^{241}Pu have decayed into ^{241}Am." The two most prevalent TRU nuclides in the waste are ^{239}Pu and ^{240}Pu and the available data indicated that the isotopic distribution values listed in Table 5, below, are representative of waste stream RLMD233SD.00.

Table 5. Isotopic Distributions Values for RLMD233SD.001

Radionuclide	% Composition
^{238}Pu	0.03 – 0.07
^{239}Pu	84.05 – 93.21
^{240}Pu	6.02 – 10.51
^{241}Pu,	0.09 – 0.64
^{242}Pu	0.02 – 0.59
^{241}Am	0.63 – 1.18
^{237}Np	Trace – 3.01
^{232}U	Trace
^{233}U	Trace
^{234}U	0.0009 – 0.016
^{235}U	0.200 – 0.989
^{236}U	Trace – 0.38
^{238}U	98.62 – 99.799

The AK documentation report indicated that trace quantities of ^{237}Np may be present, but the activity of ^{237}Np will be "orders of magnitude lower" than that of ^{241}Am. This report also states "Uranium was a trace impurity in the plutonium product from REDOX and as a result might be present in trace amounts. If present, a limiting value of 0.200% for uranium-235 (^{235}U) is used…with nominal values of ^{234}U 0.006%, ^{235}U 0.575%, and ^{238}U 99.419%." AK documentation stated that the same ^{234}U/^{235}U, ^{234}U/^{238}U, and ^{137}Cs/^{90}Sr ratios would apply to this stream. EPA found that the AK Summary and AK Documentation Report for this stream did not clearly indicate the radiological composition of the stream, and various isotopic ratios and ranges needed revision for consistency with examined references. Site representatives modified the AK Documentation Report to address these concerns, see Item (16), below.

As part of EPA's review, the use of AK data by NDA personnel was explored. EPA found that NDA personnel are required to read AK documentation containing the above information. Procedure WMP 350 Section 2.2 states how NDA personnel typically use AK information,

indicating that in all instances, the preference is to use measured isotopic information to determine drum contents. When there are interferences or other issues, NDA personnel will query AK sources (including SWITS and AK personnel) for AK information that can be used to determine the isotopic contribution of a given radionuclide or decay series. When there is no AK information and measurement data are not available, Hanford "default" values presented in Table 1 of WMP 350 Section 2.2 are used (see Section 8.1).

EPA reviewed the general approach used to determine the basic radionuclide composition of the RLVIPAC and RMLD233SD waste streams, noting that EPA had already assessed the radionuclide composition of RFETS ash in previous inspections. The NDA BDRs examined verified the general radionuclide ranges that were presented for each stream. Therefore, the AK data assembled adequately represent the general radionuclide composition of the waste streams examined, noting that individual container variability will occur.

The AKEs need to perform a thorough evaluation to determine the radionuclide content of waste. This is to ensure that appropriate support documents have been identified and used to verify the information presented in more general documentation, and to ensure that the same information typically sought by NDA personnel to address individual drum issues (e.g., SWITS) are also used by AK personnel to derive or check radionuclide AK data.

(14) Resolution of EPA AK issues identified during previous continued compliance inspections was examined.

EPA conducted its last AK inspection at Hanford prior to this baseline in June 2005 (Inspection No. EPA-Hanford-05.06-08, EPA Docket No A-98-49, II-A4-58). As a result of that inspection, three issues were identified that were examined as part of the baseline inspection. EPA evaluated Hanford's responses to all three issues and determined them to be adequate. These issues and their resolution are included in Attachment C.8 of this report.

(15) Identification of Waste Material Parameters (WMPs) and prohibited items was assessed.

The AK Documentation Reports and AK Summaries for waste streams RLVIPAC.001 and RLM233SD.001 were examined with respect to identification of waste material parameters and prohibited items. Documentation for both streams had recently been updated to include new WAP requirements mandating weight percent calculations for each WMP. The identification of WMPs, based on review of provided Disposal Records and VE/RTR data, indicate that the WMPs were sufficient, noting that variability on a container basis is expected. As stated in Item 2 above, please note that the RLM233SD.001 waste stream had an accuracy of 55% associated with the assigning of SCG.

Site representatives were asked to examine whether removal of the faulty AK associated with the 21 drums that resulted in the low accuracy from the WMP calculations would change the WMP percentages assigned to this stream. The AKE performed this calculation and indicated that the WMP percentages would not change, even when taking into account the removal of the subject 21 drums from the calculation. The AK Summaries for both streams as attached to the Waste Stream Profile Forms (WSPFs) did not detail prohibited items, but these were addressed in the AK Documentation Reports for both streams. However, the AK Documentation Reports simply

stated that drums containing prohibited items, including liquids, will be segregated, and did not provide an analysis of anticipated liquid. For consistency, future AK Summaries and Documentation Reports must indicate whether liquids, as a prohibited item, are anticipated. As written, the documents infer that the presence of liquids was a possibility, but this was unclear.

(16) AK Summaries and AK Documentation Reports were assessed.

Hanford created two AK documents that were included in the analysis: AK Summaries which were attached to the WSPFs: and, AK Documentation Reports, which included more detailed AK information and were used to prepare the AK Summaries. Because AK Summaries were essentially summaries of the more complete Documentation Reports, the contents of the AK Documentation reports were assessed, with the expectation that concerns and major changes noted in the AK Documentation Reports would result in changes to AK Summaries, as appropriate. EPA examined the RFETS AK Summary/Documentation Reports during prior inspections, and the AKE indicated that significant changes had not occurred to either, except inclusion of radionuclide data in the Documentation Report as indicated in Item (14), above.

Accordingly, EPA focused on AK Documentation Reports for the newly-generated debris stream RLVIPAC.001 and the retrievably-stored debris stream RLM233SD.001. Note that the scope of this inspection was retrievably-stored solid and debris waste, as well as newly-generated debris. EPA found that the AK Documentation Reports for the two waste streams were thorough. However, both documents included inconsistencies and incomplete information pertaining to radionuclide content and other information that required attention. Both concerns were discussed with Hanford AK personnel and EPA included them on an EPA Inspection Issue Tracking Form (See Attachment C.2 of this report) and they are discussed below.

EPA Inspection Issue Tracking Form, Issue No. HAN-AK-07-002CR: The AK Documentation Reports HNF-30266 Revision 1 and HNF-29578 present AK information pertaining to the RLVIPAC and RLM233SD D&D debris streams. Both documents adequately define the waste stream. However, revisions to the documents are required to clarify questions pertaining to WMP identification, radionuclide composition, general process clarifications, and to correct typographical and editorial errors.

For the RLVIPAC waste stream, the following revisions to the AK Documentation Report are necessary:

- Clarify that the anthropogenic nature of the entire fuel pin/assembly qualifies the pin as debris
- Revise Table 1 to clarify that ceramics, firebrick and other debris material are not expected
- Clarify that Pacific Northwest Laboratory (PNL) was not an independent source of fuel pins for the waste stream
- Add the isotopic distribution for natural uranium to Section 3.6
- Correct references and typographical issues as identified

For RLM233SD D&D debris streams, the following revisions to the AK Documentation Report are needed:

- Revise Table 5 to reference the sources for ranges presented.
- Revise Section 3.7 to explain the source of information in Table 5, including an explanation of how the data were generated or derived, information sources, data limitations, and other relevant changes to better explain the process used to generate the isotopic distribution.
- Revise Section 3.7 to explain why ^{237}Np is not an expected radionuclide even though a ^{237}Np line was installed in the 233-S facility.
- Explain what is meant by a "significant recycle" with respect to uranium in the waste stream.
- Assess whether revisions of Table 1 are required because a number of containers have been identified through RTR as containing sludges and therefore do not match the Solid Waste Disposal Records or burial records from which Table 1 values were derived.
- In light of the AK Accuracy of 55% with respect to summary category group identification, prepare an AK Reconciliation Report to address these concerns.
- Correct references and typographical issues as identified.

Resolution: Hanford responded by revising the AK Documentation Reports for waste streams RLVIPAC.001 and RLM233SD.001 to address each of the issues bulleted above. Final approved revisions of each edited document were provided to and accepted by EPA prior to the end of the inspection.

Status of Concern: EPA considers this issue closed.

This inspection was limited to the three categories of retrievably-stored solids, retrievably-stored debris and newly-generated debris. Because AK data for wastes outside these categories could be very different than the information examined (e.g., may include radionuclide data specific to high level waste and/or spent fuel) implementation of the AK process for wastes outside of these three categories (e.g., soil/gravel, newly-generated solids including K basin waste) is a T1 change. (See Table 1 where this is included as a T1 change.) Revisions of existing WSPFs, associated AK summaries and AK documentation reports signify a potentially major change in their AK content, information that impacts the waste stream's physical and radionuclide content. Additionally, EPA must be made aware of new Hanford waste streams as they come online. Providing notification to EPA upon completion of revisions of existing WSPFs, associated AK summaries and AK documentation reports, and/or generating new WSPFs, AK summaries and/or documentation reports is a T2 change. Consistent with EPA's authority under 40 CFR 194.24(h), EPA may request information related to these changes if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.)

Summary of AK Findings and Concerns

The EPA inspection team did not identify any findings related to AK during this inspection. EPA did identify the two concerns that are discussed above. Copies of the EPA Inspection Issue Tracking Forms documenting these concerns are provided in Attachments C.1 and C.2 to this report. EPA considers all concerns to have been adequately addressed and there are no open findings or concerns related to AK resulting from this inspection.

Proposed Baseline Approval

EPA is proposing for approval the AK systems evaluated during this baseline inspection as described in this report for CH retrievably-stored TRU debris (S5000) and solid wastes (S3000), and AK for newly-generated, repackaged debris (S5000) waste from PFP. Application of the AK process described in this report to wastes other than these is a T1 change. (See Table 1 where this is included as a T1 change).

Proposed AK Tiers

Based on the inspection and results discussed above, EPA proposes assigning the following tiers:

T1 AK changes will require EPA review and approval prior to implementation and will apply to any new waste category not evaluated during the baseline inspection. These include the following:

- Categories of waste not approved under this baseline inspection (e.g., newly-generated solids including K Basin waste and soil/gravel)
- Implementation of load management
- New waste streams created as a result of combining or separating previously distinct waste streams as presented in AK summaries and documentation reports written as of the date of the EPA baseline inspection

Hanford must report and submit documentation on T1 changes when it is ready for EPA review. Upon initial review, EPA will inform Hanford and CBFO whether a site inspection is necessary. EPA may request additional information, choose to conduct a desktop review, and/or confer with Hanford personnel. Upon AK evaluation with or without site inspection, EPA will issue a decision. Only upon receiving EPA written approval may Hanford dispose of the new waste at the WIPP.

T2 AK changes do not require EPA approval before implementation but require that Hanford provide notification to EPA upon completion of the following:

- Completion of AK accuracy reports
- Updates to or substantive modifications of:
    - Existing WSPFs, associated AK summaries and AK documentation reports

- AK-NDA Communication changes
- Changes to site procedure WMP 400 7.1.9

- Generation of new WSPFs, AK summaries and AK documentation reports

Following EPA approval, at the end of each fiscal quarter, Hanford must provide EPA with information on T2 changes. EPA will evaluate these changes and inform Hanford whether the changes raise any concerns and require a response or if Hanford can continue to implement the changes. EPA examined the AK process to determine whether Hanford demonstrated compliance with 40 CFR 194.8 requirements for CH retrievably-stored solid and debris wastes, and newly-generated debris wastes.

8.2 Nondestructive Assay

During this inspection, EPA inspected NDA systems located at both the WRAP and the PFP. They are listed below by facility:

WRAP

- Canberra Gamma Energy Assay System Units A and B (GEA A & GEA B)
- Pajarito Imaging Passive-Active Neutron System Units A and B (IPAN A & IPAN B)
- BII Super High Efficiency Neutron Counter A (SHENCA)

PFP

- ANTECH R, Q & P Series Calorimeters: AR-1, AR-5, P-13, P-14 and Q-1, supported by the Room 172 SGSAS for isotopic determinations

Technical Evaluation

All of the NDA systems listed above had been evaluated and approved by EPA previously in 2003 and 2005 (see Docket Nos.A-98-49, II-A4-41 and A-98-49, II-A4-58, respectively). Due to logistical constraints, this inspection focused primarily on changes to each system that occurred between EPA's last evaluation and this inspection. For that reason, considerable time was spent in preparation (reviewing documents, checking current revisions of operating procedures, etc.). Similarly, the detailed technical basis for each system's operation is described and detailed in the EPA inspection reports cited above.

WRAP NDA Systems

Since GEA Units A and B had undergone hardware changes and software upgrade(s) they had been recalibrated and both systems are essentially equivalent in terms of measurement capability. Both systems had been operational for WIPP assays prior to this inspection and both were evaluated during this inspection.

Both WRAP IPAN Units A and B were listed as operational but only IPAN A had actually performed WIPP assays in the last two years since the previous EPA inspection. Following the inspection, Hanford personnel did use the IPAN B to assay eight drums to produce one Batch Data Report (BDR No.WR-TB-2007-096) to provide objective evidence of the system's

performance and allow inclusion of the IPAN B within the scope of the inspection. In this report, the section documenting the IPAN evaluations addresses both IPAN A and IPAN B, unless otherwise specified.

The BII SHENCA was operational and was in essentially the same configuration as was observed during the last EPA inspection dated June 2005.

PFP NDA Systems

The ANTECH R Series (AR-1 and AR-5), P Series (P-13 and P-14) and Q Series (Q-1) Calorimeters in conjunction with the Room 172 SGSAS were evaluated. Each of these systems had been evaluated and approved by EPA previously for the waste types and activity ranges in effect currently. Hanford PFP personnel stated that there had not been any significant changes to these systems, which was confirmed independently by EPA during the site inspection.

Consistent with EPA's request each NDA system completed replicate assays on waste containers chosen in advance by EPA. The results of these assays were reported to EPA following the inspection and the results' evaluations are provided by instrument and discussed in this report. For each NDA system listed above, EPA reviewed the following elements of the NDA process:

- Design and technical capability of the measurement hardware and software to perform the required analyses
- Adequacy of the assay program's documents and procedures
- Knowledge and understanding of the personnel involved in the NDA program.

8.2.1 WRAP Gamma Energy Analysis (GEA) Systems Units A and B

The GEA B Unit was refurbished and recalibrated in March 2006, following which both GEA systems were equivalent in terms of their measurement capability. The checklist in Attachment A.2, in conjunction with the documents listed below, comprise the documents that were examined in assessing GEA Units A & B during this inspection:

- HNF-2600, Hanford Site Transuranic Waste Certification Plan, Revision 19
- WMP-350, Section 2.2, Revision 26, Calculation of Assay Results, May 1, 2007
- WMP-350, Section 2.3, Revision 23, Data Management
- WMP-350, Section 2.5, Revision 10, GEA Energy and Efficiency Setup and Baseline Establishment
- WMP-350, Section 2.8, Revision 5, WRAP NDA Measurement Control Program, October 9, 2006
- WMP-350, Section 2.9, Revision 2, Performing Calibration Verifications and Confirmations for Nondestructive Assay at WIPP, May 31, 2005
- WMP-350, Section 2.10, Revision 1, GEA Calibration Using NDA 2000

- WRP1-OP-0906, Gamma Energy Assay Operations, Revision 1, Change 3
- HNF-5148, Calibration Report for the WRAP Facility GEA, Revision 3, applicable to GEA-A only
- HNF-5149, Calibration Report for the WRAP Facility GEA System Unit B, Revision 1B, applicable to GEA-B only, March 6, 2006
- HNF-4050, Total Measurement Uncertainty for Nondestructive Assay of Transuranic Waste at the Waste Receiving and Processing Facility, Revision 10
- HNF-4051, Quality Assurance Objectives for Nondestructive Assay at the Waste Receiving and Processing (WRAP) Facility, Revision 9
- HNF-11129, Lower Limit of Detection (LLD) for the WRAP GEA System, Revision 0, applies to GEA-A and GEA-B
- HNF-7299, QAOs for NDA Unit GEA-B at the WRAP Facility, Revision 0
- HNF-9787, WRAP NDA Certified Radioactive Sources, Revision 0-B
- HNF-N-112-3, GEA-A Log Book, ID #9076684, Assigned 3-09-04
- Six-Month Interfering Matrix Check Report (6-1-06 – 11-30-06)
- Performance Demonstration Program for Nondestructive Assay of Drummed Wastes, Scoring Report-Cycle 13A, May 2006 Distribution, January 2007
- WR-TB-2007-082
- WR-TB-2007-091 (Sludge)
- WR-TB-2007-092 (Sludge)
- WR-TB-2006-228
- WR-TB-2006-294
- WR-TB-2007-091 (IPAN A & GEA A)[6]
- WR-TB-2006-198 (IPAN A & GEA A)

Hanford WRAP NDA personnel stated that the GEA-A and GEA-B Units have not changed or been modified in any significant way since EPA last inspected them, a condition that was confirmed by the EPA Inspection Team during this inspection. During the inspection, EPA assessed the technical elements of the WRAP GEA Units A and B that are discussed below.

(1) The design, operation and personnel of GEA Units A and B were assessed.

The GEA Units A and B (GEA-A & GEA-B) are housed in the WRAP facility. Both systems consist of six gamma detectors: four are Segmented Energy Germanium (SEGe) detectors for quantitative analysis; and two are Low Energy Germanium (LEGe) detectors used for isotopic analysis based on photons in the 45 to 300 keV range in conjunction with the Multi Group

[6] These two BDRs are listed under the GEA and IPAN sections since they contain data from both systems.

Analysis (MGA) software. AK-based isotopics are used when such determinations can be supported. The SEGe detectors address matrix correction by using four (4) highly collimated ^{152}Eu sources located directly opposite the SEGe detectors and at a right angle (90°) to the LEGe detectors. Both systems operate under the Gamma Waste Assay System (GWAS) software and include shielded enclosures, drum elevation and rotation equipment and ancillary electronics. The systems have two operational modes, a *shielded* and *unshielded* geometry, and there are limitations to both modes that are applicable to actual waste containers that are discussed in HNF-5148 and HNF-5149. These modes are used depending on a container's Pu loadings, enhanced ^{241}Am levels or significant count rates from other fission products. The main difference results in the choice of ^{239}Pu line (129 keV or 414 keV) for quantitative analysis. Additionally, there is an option regarding the use of use of the individual horizontal segments of a container's assay or summing all horizontal segments over the container's vertical height, *Sum Spectrum* or *Combine All*, respectively. These choices are incorporated in the system's software but are routinely evaluated by NDA personnel during data validation and the software's choices can be overridden. The GEA units produce data for ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{233}U, ^{235}U, and ^{238}U over a mass range from 0.135 g to 245 g (GEA-A) and 0.135 g to 245 g (GEA-B) of nominal WG Pu (6% ^{240}Pu). Technically based correlations are used to derive values for ^{234}U, ^{137}Cs and ^{90}Sr, and ^{242}Pu is determined using the correlation techniques of Gunnik. There are no technical issues associated with the design, operation and personnel associated with GEA Units A and B. The use of new, unapproved NDA equipment at WRAP or physical modifications to the WRAP GEA Units A and B observed during this inspection is a T1 change. (See Table 1 where this is included as a T1 change.)

(2) System calibration and calibration confirmation of the GEA Units A and B had been performed as required.

The calibration of the GEA-A Unit is documented in *Calibration Report for the WRAP Facility GEA System,* HNF-5148, Revision 3, and the calibration of the GEA-B Unit is documented in *Calibration Report for the WRAP Facility GEA System Unit B,* HNF-5149, Revision 1B. Both GEA units had current calibrations and both software upgrades to Genie 2000 and NDA 2000. Both system use tin shields approximately 1/32" thick on the SEGe detectors to reduce system dead time resulting from high ^{241}Am concentrations associated with aged plutonium, and the ^{152}Eu transmission sources had been to realigned to obtain better transmission on the bottom detector (SEGe 4) of each system. The Energy and Full-Width at Half Maximum (FWHM) calibrations had been performed using six (6) mixed gamma line sources (^{152}Eu/^{137}Cs/^{241}Am sources) and four (4) 55-gallon (208 liter) and 85-gallon (321 liter)over-pack matrix drums (foam, Homosote, particle board and sand) that spanned the range of 0.01 to 1.56 g/cc. The independent 85-gallon drum calibration was performed in the same manner except that the 55-gallon drum was placed inside the 85-gallon drum.

Calibration confirmation was performed using Pu sources other than the ^{152}Eu/^{137}Cs/^{241}Am sources used for calibration, as required by DOE/WIPP-02-3122. Hanford NDA personnel provided objective evidence of the appropriate pedigree for all WG Pu sources that is documented in HNF-9787, *WRAP NDA Certified Radioactive Sources*, Revision 0-B. The calibration sources consisted of weapons grade plutonium (WG Pu) sources in a variety of gram values that were combined to produce the following gram values and were used for both 55- and

85-gallon geometries: 0.135 g, 5 g, 60 g, 150 g and 245 g. The system did not pass all calibration criteria and WRAP NDA personnel instituted controls regarding the use of photon lines, specific assay modes and container sizes, all of which are incorporated in WMP-350, Section 2.2, Revision 22, Section 2.2, page 8, Table 2. There are no technical issues with the calibration and calibration confirmation of GEA Units A and B. Extension or changes to approved calibration range for the WRAP GEA Units A and B is a T1 change, (See Table 1 where this is included as a T1 change.) Also, notification to EPA upon completion of changes to software for approved equipment, operating range(s) and site procedures for the WRAP GEA Units A and B that require CBFO approval is a T2 change and requires EPA notification. Consistent with EPA's authority under 40 CFR 194.24(h), EPA may request this information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.)

(3) The Total Measurement Uncertainty (TMU) of assays performed on the GEA-A and GEA-B had been determined and documented.

The determination of the TMU of assays performed on the GEA Units A and B is documented in HNF-4050, Revision 10. The components of uncertainty included in the TMU determination included calibration source uncertainties, counting statistics, self-absorption effects, matrix non-homogeneities, non-uniform source distributions, and isotopic measurement uncertainties. There are no issues with the determination and documentation of TMU for GEA-A and GEA-B.

(4) The lower limits of detection (LLD), including the minimum detectable concentration or MDC[7], of the GEA-A and GEA-B had been determined and documented.

The LLD was defined in the Hanford Site Transuranic Waste Certification Plan, HNF-2600, Revision 19, as "that level of radioactivity which, if present, yields a measured value greater than the critical level with a 95% probability, where the critical level is defined as that value which measurements of the background will exceed with 5% probability." The LLD of any given NDA measurement is likely to depend on the type of measurement, the properties of the waste matrix being assayed, and the environmental background. For this reason, the LLD will vary from drum to drum and may even vary between measurements of the same drum.

The GEA-A and GEA-B systems report an LLD for each of the ten (10) WIPP-tracked radionuclides for each. Only measured values that exceed the reported LLD for that measurement will be reported and used in calculations of derived quantities, such as total TRU alpha activity and TRU alpha activity concentration. The LLD (and MDC) are documented in HNF-11129, Revision 0 and Figure 1 of this document shows that the MDC for the GEA systems is below 100 nCi/g for waste with a density above about 0.15 kg/liter. Both the GEA-A and GEA-B have the required sensitivity to make TRU/Non-TRU determinations in accordance with the 100 nCi/g TRU criterion. There are no technical issues with the determination and documentation of the LLD for the GEA-A and GEA-B units.

[7] The distinction between a measurement system's LLD and MDC is not necessarily meaningful in this context. These terms are retained for the sake of consistency with Hanford technical reports.

(5) The GEA Units A and B had participated in the CBFO-sponsored Performance Demonstration Program (PDP).

Both GEA Units participated most recently in Cycle 13A (May 2006 distribution, January 2007 scoring) of the CBFO-sponsored NDA PDP, by assaying four drums, a non-interfering matrix, a combustible matrix, a glass matrix, and a metal matrix. Upon evaluation by CBFO the measurement objectives for both GEA Units for all four containers met all PDP performance criteria and the GEA-A and GEA-B were approved for use at Hanford without reservation.

(6) EPA replicate testing of the GEA-A and GEA-B Units was performed and evaluated.

The purpose of the replicate testing performed as part of this inspection is to provide the EPA with an independent means to verify that the GEA-A Unit can provide reproducible results for the determination of the quantity of ten WIPP-tracked radionuclides (^{241}Am, ^{137}Cs, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{90}Sr, ^{233}U, ^{234}U, and ^{238}U) and the TRU alpha concentration. This is accomplished by reassaying drums previously measured on the same system in order to demonstrate the following the system's ability to do the following:

- Produce results consistent with the reported TMU by comparing the sample standard deviation for a number of replicate measurements taken over several hours or days to the reported TMU; and
- Provide reproducible results over longer periods of time, such as weeks or months, by comparing the results of the replicate measurement(s) to the original reported values.

As part of the inspection to evaluate the GEA units, EPA requested that each GEA unit reassay one drum that EPA randomly selected from a list of previously assayed drums. EPA chose container No. 0038035 for GEA-A and 3536-8-37 for GEA-B, and both drums were reassayed on the same GEA unit five (5) times and the data for the five replicates and the original assay were analyzed using two statistical tests, a *Chi-Squared (χ^2) Test* and a *t Test*. Data and results of the statistical analysis for both units are included in Attachments B.1 - B.4. Note that the both GEA units were operating the quantitative mode for these assays. Evaluation of the GEA-A for providing only isotopic information is addressed in Section 8.2.2 (6), below, where it was used in conjunction with the IPAN A.

The *t Test* for both containers assayed on the GEA-A and GEA-B did not show any statistically significant differences between the original measurement assay values and the average of the five replicate measurements for the activities of any of the target radionuclides or the TRU Alpha Activity Concentration. The χ^2 test for both containers assayed on the GEA-A and GEA-B units showed that the observed variances in the replicate measurements are less than or equal to the reported uncertainties within the statistical limits of the test. There are no technical issues associated with replicate testing of GEA Units A and B.

8.2.2 Pajarito Imaging Passive-Active Neutron (IPAN) System Units A and B

IPAN-A and IPAN-B were last recalibrated in March 2006 to accommodate sludge matrices and both units are treated as equivalent in this section unless otherwise indicated. The checklist in

Attachment A.3, in conjunction with the documents listed below, comprise the documents that were examined in assessing IPAN Units A & B during this inspection:

- HNF-2600, Hanford Site Transuranic Waste Certification Plan, Revision 19
- HNF-16729, WRAP IPAN Systems Calibration Test Report, Revision 2, May 2006
- HNF-16730, WRAP Drum IPAN Systems TMU Report, Revision 0
- WMP-350, Section 2.2, Revision 26, Calculation of Assay Results, May 1, 2007
- WMP-350, Section 2.3, Revision 23, Data Management
- WMP-350, Section 2.8, Revision 5, WRAP NDA Measurement Control Program, October 9, 2006
- WMP-350, Section 2.9, Revision 2, Performing Calibration Verifications and Confirmations for Nondestructive Assay at WIPP, May 31, 2005
- WMP-350, Section 2.5, Revision 10, GEA Energy and Efficiency Setup and Baseline Establishment
- HNF-4051, Quality Assurance Objectives for Nondestructive Assay at the Waste Receiving and Processing (WRAP) Facility, Revision 9
- Six-Month Interfering Matrix Check Report (6-1-06 – 11-30-06)
- Performance Demonstration Program for Nondestructive Assay of Drummed Wastes, Scoring Report-Cycle 13A, May 2006 Distribution, January 2007
- WR-TB-2007-096 (IPAN B & GEA A)
- WR-TB-2007-091 (IPAN A & GEA A)
- WR-TB-2006-198 (IPAN A & GEA A)

WRAP NDA personnel stated that the IPAN-A and IPAN-B Units have not been changed or modified in any significant way since the recalibration that is documented in HNF-16729, Revision 1, May 2006, a condition that the EPA inspection team confirmed by visual inspection at WRAP. During the inspection, EPA assessed several technical elements of the WRAP IPAN Units A and B that are discussed below.

(1) The design, operation and personnel association with IPAN Units A and B were assessed.

The WRAP IPAN Systems are dual-mode neutron systems and from an operational perspective the systems are equivalent, although each one is treated individually with a unique calibration and LLD. These systems are used to assay containers (55- and 85-gallons) of TRU waste, and both systems have separate calibrations for each mode (Active and Passive) and container size, however the Passive Mode calibration applies to both 55- and 85-gallon containers because there is no significant (measurable) difference in signal between the two geometries. The systems are calibrated for matrices in terms of a group of correction factors (CFs): an absorber index (ABS) for Passive Mode; and, an Absorber-Moderator Index (ABSMOD) for Active Mode. The CFs

for both IPAN systems are listed in the Calibration Test Report (HNF-16729, Revision 2[8]) and are instrument and matrix specific, as shown in Table 6. Note that the 85-gallon geometry requires a separate ABSMOD CF while the 55-gallon geometry does not. Mass calibration ranges are equivalent for both systems, i.e., LLD to 10 g WG Pu for Active Mode and 10 g to 120 g WG Pu for the Passive Mode.

The quantitative neutron data from Active or Passive Mode assays are combined with gamma isotopic values derived from the GEA A or B units, described above, to produce data for a group of radionuclides, including: ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{233}U, ^{235}U and ^{238}U; calculations and technically based correlations are used to derive values (plus uncertainties) for ^{234}U, ^{137}Cs and ^{90}Sr; ^{242}Pu is determined using the correlation techniques of Gunnik. The individual radionuclide values are used to compute derived quantities such as TRU activity, Plutonium Fissile Gram Equivalents (FGE) and Decay Heat for each waste container. There are no issues with the design, operation and personnel associated with WRAP IPAN Units A and B. The use of new, unapproved NDA equipment at WRAP or physical modifications to the WRAP IPAN Units A and B observed during this inspection is a T1 change. (See Table 1 where this is included as a T1 change.)

Table 6. Active and Passive Mode Correction Factor Ranges for IPANs

ABS or MOD CF Range	IPAN-A	IPAN-B
Debris MOD – 55 gallon	1.22 to 12.14	1.16 to 11.71
Sludge MOD – 55 gallon	1.22 to 19.94	1.16 to 19.02
Debris ABSMOD – 55 gallon	50.87 to 287.69	47.77 to 271.98
Sludge ABSMOD – 55 gallon	50.87 to 412.55	50.87 to 412.55
Debris ABSMOD – 85 gallon	59.36 to 280.48	57.70 to 277.32

(2) System calibration and calibration confirmation of the IPAN Units A and B had been performed and confirmed as required.

Initial calibrations for the IPAN units were performed in 2001 and were confirmed in 2002 for the active and passive modes using the following masses of WG Pu as follows: 0.1 g (active mode); 10 g (active and passive modes); 50 g (passive mode); and, 100 g (passive mode).

Passive mode confirmations were performed in March 2006 using a 198 g WG Pu source. Linearity checks had also been performed in the active mode using a series of WG Pu sources as well as with a 0.5 g ^{239}Pu $_{\text{Effective}}$ (^{239}Pu$_{\text{EFF}}$) mass source[9]. Passive mode linearity checks were performed with 1, 4, 5, 10, 15, 35, 60, 90 and 120 g WG Pu as well with a 64 g WG Pu equivalent ^{252}Cf source. Linearity for the sludge calibration was demonstrated in 2006 using 1.9, 9.9 and 35.6 g WG Pu sources in the active mode and 9.9, 35.6, 102 and 198 g WG Pu sources in

[8] This document is also called BII-5142-CTR-001, Revision 2, May 2006.

[9] ^{239}Pu$_{\text{EFF}}$ refers to an amount of SNM that would produce the same number of spontaneous fissions as an equal amount of ^{239}Pu under the same measurement conditions. Mass values for depleted uranium (DU) sources that are used for passive neutron assay systems are typically expressed in terms of their ^{239}Pu$_{\text{EFF}}$.

the passive mode. All sources were appropriate for their use and were supported by certificates of traceability as required. All calibrations and confirmations were technically acceptable and adequately documented. There re no technical issues with the calibration or calibration confirmation of WRAP IPAN Units A and B. Extension or changes to approved calibration range for the WRAP IPAN Units A and B is a T1 change, (See Table 1 where this is included as a T1 change.) Also, notification to EPA upon completion of changes to software for approved equipment, operating range(s) and site procedures for the WRAP IPAN Units A and B that require CBFO approval is a T2 change and requires EPA notification. Consistent with EPA's authority under 40 CFR 194.24(h), EPA may request this information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.)

(3) The TMU of assays performed on the IPAN-A and IPAN-B had been determined and documented.

TMU for both IPAN units is documented in HNF-16730, Revision 0. This report addresses all relevant contributions to TMU for both IPAN systems. There are no technical issues with the determination or documentation of TMU for IPAN Units A and B.

(4) The lower limits of detection (LLD), including the minimum detectable concentration or MDC, of the IPAN-A and IPAN-B had been determined and documented.

The LLD for both IPAN units is documented in HNF-16729, which provides an Active Mode (ABSMOD) and Passive Mode (MOD) LLD for debris and sludge matrices according to ABSMOD and MOD indices. These are listed in Tables 9 and 10, respectively. The Active Mode LLD has been determined to be less than 100 nCi/gram to enable the discrimination of TRU/Non-TRU wastes over the operational range of ABSMOD indices. The Passive Mode LLD is less than 1 g WG Pu for debris and less than 2 g WG Pu for sludge over the operational range of MOD indices but this is not necessarily applicable to routine assays since samples that are below the Passive Mode detection limit can be assayed in Active Mode. There are no technical issues with the determination or documentation of LLD for IPAN Units A and B.

(5) The IPAN Units A and B had participated in the CBFO-sponsored PDP.

Both IPAN Units participated most recently in Cycle 13A (May 2006 distribution, January 2007 scoring) of the CBFO-sponsored NDA PDP, by assaying four drums, a non-interfering matrix, a combustible matrix, a glass matrix and a metal matrix. Upon evaluation by CBFO, measurement objectives for both IPAN units met all PDP performance criteria for all four containers and the IPAN-A and IPAN-B were approved for use at Hanford without reservation.

(6) EPA replicate testing of the IPAN-A Unit was performed and evaluated.

The purpose of the replicate testing performed as part of this inspection is to provide the EPA with an independent means to verify that IPAN Units can provide reproducible results for the determination of the quantity of ten WIPP-tracked radionuclides (^{241}Am, ^{137}Cs, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{90}Sr, ^{233}U, ^{234}U, and ^{238}U) and the TRU alpha concentration. This is accomplished

by reassaying a drum previously measured on the same system in order to demonstrate the following the system's ability to do the following:

- Produce results consistent with the reported TMU by comparing the sample standard deviation for a number of replicate measurements taken over several hours or days to the reported TMU; and
- Provide reproducible results over longer periods of time, such as weeks or months, by comparing the results of the replicate measurement(s) to the original reported values.

As part of the inspection to evaluate the IPAN units, EPA requested that the IPAN-A reassay one drum that EPA randomly selected from a list of drums previously assayed on this unit. EPA chose container No. 22-14 which was reassayed on the IPAN-A five (5) times and the data for the five replicates and the original assay were analyzed using two statistical tests, a *Chi-Squared (χ^2) Test* and a *t Test*. Data and results of the statistical analysis are included in Attachments B.7 and B.8. Note that the IPAN assay used isotopic data from GEA-A, as discussed in Section 8.2.1(6), above. Replicate testing for the IPAN-B was not performed during this inspection.

The *t Test* for the container assayed on the IPAN-A did not show any statistically significant differences between the original measurement assay values and the average of the five replicate measurements for the activities of any of the target radionuclides or the TRU Alpha Activity Concentration. The χ^2 test for the container assayed on the IPAN-A showed that the observed variances in the replicate measurements are less than or equal to the reported uncertainties within the statistical limits of the test. There are no technical issues associated with replicate testing of IPAN-A.

8.2.3 Super High Efficiency Neutron Counter A (SHENCA)

The checklist in Attachment A.4, in conjunction with the documents listed below, comprise the documents that were examined in assessing the SHENCA during this inspection:

- HNF-2600, Hanford Site Transuranic Waste Certification Plan, Revision 16
- TRU-OP-002, Operation of the SuperHENCA Assay System, Revision C, Change 0, May 21, 2007
- WMP-350, Section 2.2, Revision 27, Calculation of Assay Results, May 1, 2007
- WMP-350, Section 2.3, Revision 21, Data Management
- WMP-350, Section 2.8, Revision 5, WRAP NDA Measurement Control Program, October 9, 2006
- WMP-350, Section 2.9, Revision 2, Performing Calibration Verifications and Confirmations for Nondestructive Assay at WIPP, May 31, 2005
- HNF-26085, BIL Solutions, Inc. Calibration and Validation Report for the SuperHENC Mobile Assay System (SHENCA), Revision 2 (also called Revision 0-A), May 2005; also known as BII-5169-C&VR-001, P.O. 21942

- BII-5169-ADD-001, Algorithm Definition Document, Revision 2, November 2004
- M4T00-TRU-04-804, RLM308D, Revision 2
- M4T00-TRU-04-540, RLCFFD, Revision 1
- HNF-9787, WRAP NDA Certified Radioactive Sources, Revision 0, EDT 623618
- SHENCA Log Book HNF-N-552-1, June 23, 2005, observed in SHENCA Trailer
- SHENCA Gamma Log Book HNF-N-3311-1, December 22, 2005, observed in SHENCA Trailer
- Six-Month Interfering Matrix Check Report (June 1, 2006 through November 30m 2006)
- Performance Demonstration Program for Nondestructive Assay of Boxed Wastes, Scoring Report-Cycle B6A, July 2006 Distribution, January 2007
- WRAP SHENCA Batch Data Report, WR-TB-2006-180 SWB
- WRAP SHENCA Batch Data Report, WR-TB-2007-024 SWB
- WRAP SHENCA Batch Data Report, WR-TB-2006-299 SWB

During the inspection, EPA assessed several technical elements of the Hanford SHENCA that are discussed below.

(1) The design, operation and personnel of the SHENCA were assessed.

The SHENCA is housed in its own trailer and is currently located in the Central Waste Complex near the WRAP facility. It is capable of assaying two types of waste container: Standard Waste Boxes (SWBs) that measure approximately 71" x 37" x 54"; and, 55-gallon (208-liter) drums. The system is currently calibrated only for SWBs and no other container types can be assayed unless further system performance testing is performed and documented. The SHENCA incorporates both a passive neutron counter and an integral gamma-ray spectrometer. The passive neutron counter operates in standard neutron coincidence mode and multiplicity mode.

It uses banks of ^{3}He proportional counters along with an Add-a-Source (AaS) matrix correction via a ^{252}Cf source to provide matrix correction to raw counting data that in coincidence mode are expressed as ^{240}Pu Effective (^{240}Pu $_{EFF}$).[10] The ^{240}Pu $_{EFF}$ is the amount of ^{240}Pu that would produce the observed true coincidence rate after correcting for the neutron moderation properties of the waste matrix and represents the amount of spontaneously fissioning material inside the drum. The quantity of individual TRU radionuclides can be related to the ^{240}Pu effective if the relative ratios of the quantities of the radionuclides, including all spontaneously fissioning radionuclides, is measured or otherwise known. In the SHENCA, the isotopic ratios distribution is determined by direct gamma determination as discussed below. Version 2.0 of the Los Alamos National Laboratory Neutron Coincidence Counting (LANL NCC) software operates the SHENCA. Version 2.0 of SUPERHENC.EXE is used for all neutron data acquisition. Multiplicity Mode counting is relevant at higher Pu concentrations and Hanford personnel stated

[10] In general, Weapons Grade Plutonium (WG Pu) is approximately 6% ^{240}Pu and Pu isotopics can be designated in terms of their ^{240}Pu content, i.e., WG Pu is synonymous with 6% ^{240}Pu or 6 g ^{240}Pu $_{EFF}$.

that it is included to enable the system to perform measurements for material control and accountability (MC&A) or Safeguards.

HNF-26085, Section 4.11 expressly states that the SNEHCA is not qualified for WIPP assays in multiplicity mode. Section 4.14.9 of the same document states that this effect is not relevant at Pu concentrations less that 100 g and that "multiplicity effects will result in less than a 1.5% increase in emission" for each SWB. The upper limit for an SWB is 325 g however, this instrument may be used for safeguards or accountability measurements that have higher limits but this use is outside of the scope of this inspection.

The integral gamma-ray spectrometer is called the SuperHENC Gamma Energy Analysis System (SGEAS) and consists of a single high purity germanium (HPGe) coaxial detector. The detector is provided with a fixed filter of 1.09 mm cadmium (lined with polyethylene) to reduce the strong gamma emissions of the 59 keV photons of ^{241}Am associated with aged WG Pu. Version 6.3 of Ortec's MAESTRO MCA32.exe software is used for all gamma data acquisition and the integration of neutron and gamma data is performed by Version 1.1 of BIL Solutions NGE.exe software. The SGEAS is used for two types of measurements:

- In relative ratio mode: to acquire the gamma-ray spectrum to be analyzed by PC-FRAM (Version 4.2) for use in conjunction with neutron assay data
- In absolute mode: to provide direct quantification of a number of radionuclides, including ^{238}Pu, ^{239}Pu, ^{241}Pu, ^{241}Am, ^{233}U, ^{235}U, ^{238}U, ^{137}Cs, and ^{237}Np based on analysis of the acquired gamma spectra. The uncertainty associated with the absolute mode determinations is expected to be greater than the neutron based determinations in most instances. This typically results in the neutron assay values being chosen over gamma values for the purpose of certifying a container of TRU waste. However, containers that display elevated neutron emission from (α, n) reactions or that contain significant quantities of uranium isotopes are excellent candidates for absolute mode determinations.

There are no technical issues with the design, operation and personnel associated with the WRAP SHENCA. The use of new, unapproved NDA equipment at WRAP or physical modifications to the WRAP SHENCA system observed during this inspection is a T1 change. (See Table 1 where this is included as a T1 change.)

(2) System calibration and calibration confirmation for the Hanford SHENCA had been performed and documented in both neutron and gamma operational modes.

The calibration of the SHENCA is documented in *Calibration and Validation Report SuperHENC Mobile Assay System SHENCA*, HNF-26085, Revision 0-A, dated May 2005. The calibration report references HNF-22923, *Calibration and Validation Plan SuperHENC Mobile Assay System* but this document was not reviewed during the inspection. The calibration was performed using plastics, dry combustibles, wet combustibles and metal matrices and is applicable to S5400 heterogeneous debris waste packaged in SWBs. The passive neutron calibration of this equipment was performed in May 2005. The chamber efficiency was determined using a ^{252}Cf source (~78,781 n/s as of 12-17-04) followed by a system normalization. The calibration confirmation was performed using PDP-type WG Pu standards

that ranged in certified plutonium values from 0.297 g to 485.4354 g (0.018 and 30.106 g $^{240}Pu_{EFF}$), the latter value being a composite of approximately 19 discrete WG Pu sources. A complete listing of all sources used is provided in HNF-9787, WRAP NDA Certified Radioactive Sources. The qualified range was presented for doubles mode as 0.36 g to 30.1 g $^{240}Pu_{EFF}$ (6 g to 502 g WG Pu). All neutron calibration and calibration confirmation assays were technically acceptable and appropriately documented.

The absolute mode energy calibration of the integral gamma-ray spectrometer was performed using six (6) ^{152}Eu line sources and cadmium and steel filters in an empty, dry combustibles and a metal box. The SGEAS's efficiency calibration was performed using six (6) $^{152}Eu/^{137}Cs/^{241}Am$ line sources in three configurations, empty, dry combustibles and metals, and produced an energy range of approximately 59 keV to 1489 keV. The gamma calibration confirmation was performed using the same WG Pu standards discussed for the neutron confirmation, above. The gamma operating range is provided in HNF-26085 as a "Qualified Pu Range" of LLD – 445.31 g ^{239}Pu (at 413.7 keV). Because the gamma efficiency calibration is not a mass calibration in the strict sense the range is more appropriately expressed in terms of the energy and efficiency ranges (these are the same) with the upper end limited by the system's performance, i.e., dead-time and resolution or peak shape considerations. Provided a gamma measurement is within the system's energy calibration range and all other performance-based criteria and system checks are met, the measurement would be valid irrespective of the Pu mass measured. The Absolute Gamma Mode's energy range is stated appropriately as 121.8 keV to 1121.1 keV in HNF-26085, Table 61.

The EPA inspection team noted that HNF-26085, Revision 0-A contained errors. These were discussed with WRAP NDA personnel and EPA included it on an EPA Inspection Issue Tracking Form (See Attachment C.3 of this report for a copy of this form) and it is discussed below.

EPA Inspection Issue Tracking Form, Issue No. HAN-NDA-07-003C: HNF-26085, Section 4 states that the SuperHENC operating procedure TRU-OP-002 "…describes the conditions that require the additional filter…" TRU-OP-002 does not contain this information for the application of steel filters that is discussed in HNF-26085. WRAP NDA personnel stated that the use of the steel filters has not ever been required for a SWB assay on the SuperHENC. The Radioassay Data Sheets (RDS) for the SuperHENC contain an entry of the sample's Total Alpha Activity expressed in Curies (Ci). The value listed actually presents the sample's total activity, i.e., a sum of the activities in Ci of all alpha, beta and gamma emitting radionuclides listed. WRAP NDA personnel stated that all SuperHENC RDSs contain this error.

Resolution: WRAP NDA personnel accepted the two issues presented in the concern and stated that the two errors would be addressed in revisions of HNF-26085. No formal response was required.

Status of Concern: EPA considers this issue closed.

There are no technical issues with the calibration and calibration confirmation of the WRAP SHENCA. Extension or changes to approved calibration range for the WRAP SHENCA is a T1

change. (See Table 1 where this is included as a T1 change.) Also, notification to EPA upon completion of changes to software for approved equipment, operating range(s) and site procedures for the WRAP SHENCA that require CBFO approval is a T2 change and requires EPA notification. Consistent with EPA's authority under 40 CFR 194.24(h), EPA may request this information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.)

(3) The TMU of assays performed on the SHENCA had been determined and documented.

The determination of the TMU of assays performed on the SHENCA was documented in *Calibration and Validation Report, SuperHENC Mobile Assay System (SHENCA),* HNF-26085, Revision 1, dated May 2005. Among the components of uncertainty included in the TMU determination for the passive neutron measurement were contributions from the calibration uncertainty, neutron counting statistics, matrix and source distribution effects, background effects for high Z waste matrices, and uncertainties due to isotopics, chemical forms, and neutron multiplication. For the gamma-based determinations, components of uncertainty included in the TMU determination included calibration source uncertainties, counting statistics, self-absorption effects, matrix non-homogeneities, non-uniform source distributions, and isotopic measurement uncertainties. There are no technical issues with regard to the determination and documentation of TMU for the WRAP SHENCA.

(4) The lower limits of detection (LLD), including the minimum detectable concentration (MDC) of the SHENCA had been determined and documented.

The LLD was defined in the Hanford Site Transuranic Waste Certification Plan, HNF-2600, Revision 19, as "that level of radioactivity which, if present, yields a measured value greater than the critical level with a 95% probability, where the critical level is defined as that value which measurements of the background will exceed with 5% probability." The LLD of any given NDA measurement depends on the type of measurement (i.e., passive neutron vs. gamma), the properties of the waste matrix being assayed, and the environmental background. For this reason, the LLD will vary from drum to drum and may even vary between measurements of the same drum.

The SHENCA estimates and reports the LLD of each of the ten (10) WIPP-tracked radionuclides for each measurement in both gamma and neutron modalities although HNF-260865 states that the "neutron LLDs…should be regarded as the primary LLD for Pu." Gamma LLD values are provided only for the absolute mode determinations; isotopic mode assay LLDs are referred to as "LLD equivalents" in HNF-26085 because PC-FRAM uses a complex algorithm based on scaling the LLD to a measured value (i.e., the passive neutron-derived ^{240}Pu value). Only measured values that exceed the reported LLD for that measurement will be reported and used in calculations of derived quantities, such as total TRU alpha activity and TRU alpha activity concentration. The SHENCA has the required sensitivity to make TRU/Non-TRU determinations in accordance with the 100 nCi/g TRU criterion. There are no technical issues with regard to the determination and documentation of the LLD for the WRAP SHENCA.

(5) The SHENCA had participated in the CBFO-sponsored PDP.

The SHENCA participated most recently in Cycle B6A of the CBFO-sponsored NDA PDP, by assaying three matrices, a non-interfering matrix (empty SWB), combustibles and metals. Upon evaluation by CBFO, measurement objectives for all three containers met all PDP performance criteria and the SHENCA was approved for use at Hanford without reservation.

(6) EPA replicate testing of the SHENCA was performed and evaluated.

The purpose of the replicate testing performed as part of this inspection is to provide the EPA with an independent means to verify that the SHENCA can provide reproducible results for the determination of the quantity of ten WIPP-tracked radionuclides (^{241}Am, ^{137}Cs, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{90}Sr, ^{233}U, ^{234}U, and ^{238}U) and the TRU alpha concentration. This is accomplished by reassaying containers previously measured on the same system in order to demonstrate the system's ability to do the following:

- Produce results consistent with the reported TMU by comparing the sample standard deviation for a number of replicate measurements taken over several hours or days to the reported TMU; and
- Provide reproducible results over longer periods of time, such as weeks or months, by comparing the results of the replicate measurement(s) to the original reported values.

As part of this inspection, EPA requested that Hanford reassay one SWB that EPA randomly selected from a list of items previously assayed on the SHENCA. EPA chose Container No. 0014593 that was reassayed five (5) times and the data for each replicate assay were analyzed using two statistical tests, a *Chi-Squared (χ^2) Test* and a *t Test*. Data and results of the statistical analysis are included in Attachments B.5 and B.6.

The χ^2 *Test* for Containers 0014593 showed that the observed variances in the replicate measurements are less than or equal to the reported uncertainties within the statistical limits of the test. The *t Test* for Container 0014593 did not show any statistically significant differences between the original measurement values and the average of the five replicate measurements for the activities of any of the target radionuclides or the TRU Alpha Activity Concentration. There are no technical issues with regard to replicate testing for the WRAP SHENCA

8.2.4 ANTECH R, P & Q Series Calorimeters: AR-1, AR-5, P-13, P-14 and Q-1, Supported by the Room 172 SGSAS for Isotopic Determinations

The calorimeters used in PFP had been evaluated and approved by EPA previously in 2003 and 2005 (see Docket Nos. A-98-49, II-A4-41 and A-98-49, II-A4-58, respectively). Prior to this baseline inspection, Hanford PFP personnel stated that the only changes to these systems since the 2005 EPA inspection were that some of the calorimeters had been permanently removed from service, reflecting a shift in PFP mission and changes in analytical workload. Upon confirming that this was the case during the inspection, the EPA Inspection Team chose to limit the evaluation of the calorimeters and Room 172 SGSAS to the following:

- Reviewing calibration reports for each calorimeter that were provided by PFP NDA personnel
- Visually inspecting the instruments currently operating in Room 172 of the PFP
- Interviewing NDA personnel responsible for calorimeters/SGSAS operations including calibration, performance testing and maintenance and data evaluation
- Evaluating the results of the EPA Replicate Testing Protocol

The checklist in Attachment A.5, in conjunction with the documents listed below, comprise the documents that were examined in assessing the calorimeters and the Room 170 SGSAS during this inspection:

- HNF-2600, Hanford Site Transuranic Waste Certification Plan, Revision 19
- Total Measurement Uncertainty for the PFP Calorimetry Systems, HNF-15103, Revision 3, November 19, 2003
- LLD Determination for PFP Residues, HNF-110607, Revision 2
- Calibration Report for the Room 172 SGSAS, HNF-14035, Revision 1, October 18, 2004
- Calibration Report for the ANTECH AR-1 Calorimeter, HNF-14135, Revision 2, January 20, 2004
- Calibration Report for the ANTECH AR-5 Calorimeter, HNF-14449, Revision 1, November 19, 2003
- Calibration Report for the ANTECH P-13 Calorimeter, HNF-15785, Revision 0, June 2, 2003
- Calibration Report for the ANTECH P-14 Calorimeter, HNF-115788, Revision 0, June 12, 2003
- Calibration Report for the ANTECH Q-1 Calorimeter, HNF-15794, Revision 1, October 18, 2004
- P-13 Calibration Verification – December 8, 2006
- AR-5 Calibration Verification – October 10, 2006
- P-14 Calibration Verification – May 24, 2006
- P-13 Calibration Verification – June 14, 2006
- AR-5 Calibration Verification – July 18, 2005
- P-13 Calibration Verification – October 20, 2006

All five PFP calorimeters are isothermal air bath systems that operate in the servo control mode to measure the thermal power of an item, i.e., the heat generated by the alpha decay of the item's nuclear material content. The Q-Series Calorimeters differ slightly from the P-Series and R-Series in that it measures the flow of heat between the inner and middle cylinders using a series of thermopiles rather than resistance thermometry. Accordingly, Q-1 has hardware

changes and corresponding software changes to accommodate this slightly different operation. All five calorimeters were calibrated and the calibration of each system was confirmed. The reports cited above provide adequate documentation of all calibration and calibration confirmation activities.

(1) Past performance, maintenance and personnel related to all operating calorimeters and the Room 172 SGSAS were evaluated.

Based on the information examined during this inspection the EPA Inspection Team members did not identify any issues related to the calibration, performance or maintenance of the operating calorimeters or the SGSAS in Room 172 of the PFP. A visual inspection of the facilities as well as interviews with Hanford NDA personnel provided evidence of adequate operations in assaying WIPP wastes for all calorimeters. There is no CBFO-sponsored PDP for small container (cans) NDA measurement systems at this time. There had been several calibration verifications performed during late 2005 and 2006 due to repairs and routine maintenance and these were documented in calibration verification reports. The EPA inspection team reviewed six calibration verification reports for these systems as shown in Table 7. All calibration verification reports were technically adequate. Personnel training records indicated that the training of PFP NDA personnel was current. There are no technical issues related to the performance, maintenance or personnel associated with calorimeters AR-1, AR-5, P-13, P-14 and Q-1 and the Room 172 SGSAS at PFP. The use of new, unapproved NDA equipment within PFP or physical modifications to calorimeters AR-1, AR-5, P-13, P-14 and Q-1 and the Room 172 SGSAS system observed during this inspection is a T1 change. (See Table 1 where this is included as a T1 change.)

Table 7. Calibration Verifications for PFP Calorimeters

Verification Date	Calorimeter Number
December 8, 2006	P-13
October 10, 2006	AR-5
May 24, 2006	P-14
June 14, 2006	P-13
June 23, 2005	AR-5
October 20, 2005	P-13

(2) System calibration and calibration confirmation for the PFP calorimeters AR-1, AR-5, P-13, P-14 and Q-1 had been performed and documented for all operational modes.

All five calorimeters that were operational in PFP at the time of this inspection had been calibrated, as documented in the calibration reports cited above. Calorimeters calibration was performed over a range of wattages, typically at wattage values of 0.3, 0.6, 0.9 and 1.2, all of which were created using a resistor plate in conjunction with a digital volt meter (DVM), both of which are National Institutes of Standards nd Technology (NIST) traceable. The calorimeters were calibrated for the End Point, Prediction and Equilibrium + 60 Minute operational modes as shown in Table 8, for an operational range of 0.0 to 1.2 watts, the equivalent of the system's

LLD to 190 g WG Pu. Following calibration, each calorimeter had its calibration confirmed for each of the operational modes for which it had been originally calibrated.

Confirmations were performed using 30 and 130 g NIST traceable WG Pu NTP sources. The 30 g source was NTP-0146; the 130 g source consisted of NTP-0138 (14.977 g), NTP-0154 (49.973 g) and NTP-0152 (64.978 g). Certificates for all NTP Pu sources were reviewed. All calibrations and confirmations were performed using a specific calorimeter in conjunction with an isotopic determination from the Room 172 SGSAS. Since the SGSAS provides only a relative isotopic measurement the calibration in conjunction with the calorimetric assay is adequate. There are no technical issues with the calibration and calibration confirmation for calorimeters AR-1, AR-5, P-13, P-14 and Q-1 and the Room 172 SGSAS at PFP. Extension or changes to approved calibration range for the PFP calorimeters and Room 172 SGSAS is a T1 change. (See Table 1 where this is included as a T1 change.) Also, notification to EPA upon completion of changes to software for approved equipment, operating range(s) and site procedures for the PFP calorimeters and Room 172 SGSAS that require CBFO approval is a T2 change and requires EPA notification. Consistent with EPA's authority under 40 CFR 194.24(h), EPA may request this information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.)

Table 8. Approved Operational Modes for PFP Calorimeters

Operational Mode	AR-1	AR-5	P-13	P-14	Q-1
End Point	Yes	Yes	Yes	Yes	Yes
Prediction	Yes	Yes	Yes	Yes	Yes
Equilibrium+ 60 Minute	No	No	Yes	Yes	Yes

(3) The TMU of assays performed on the PFP calorimeters had been determined and documented.

The TMU for these five calorimeters used in conjunction with the Room 172 SGSAS is documented in HNF-15103, Revision 3. This document adequately identified and quantifies all sources of uncertainty. There are no issues with the determination or documentation of TMU for calorimeters AR-1, AR-5, P-13, P-14 and Q-1 and Room the 172 SGSAS at PFP.

(4) The lower limits of detection (LLD) of the PFP calorimeters had been determined and documented.

The LLD for all five calorimeters had been established and documented in HNF-14038 for the end point, prediction and equilibrium operational modes. Beginning in 2003, PFP personnel expressed the LLD in terms of wattage instead of mass, i.e., grams of Pu, to allow for items with higher specific wattage values relative to WG Pu, specifically ^{238}Pu-bearing wastes (Heat Source or HS Pu)[11]. This approach is clearly preferable because it expresses the instrument's sensitivity in terms of the attribute that is actually measured, heat, and it allows for assays of mixtures of

[11] The typical accuracy of each of the five calorimeters is approximately 0.0025 Watts, which equals 1 g WG Pu.

WG and HS Pu. The LLD values for all operational modes were averaged and the average was reported as the instrument-specific LLD value as shown in Table 9. Since the LLD values differ by calorimeter, Hanford has elected to assign the most restrictive (highest) value of 0.0145 Watts (derived for P-13) as the LLD of record for all five calorimeters.

Section 5 of HNF-14038 did not present a sufficiently clear explanation regarding the exact derivation and statistical approach used for the LLD determination. Discussions with PFP and MCS personnel (M. Cameron, G. Westik and B. Gillespie) provided additional technical details and a better description of their approach's conceptual basis. The approach is technically acceptable and PFP personnel agreed that this section would be revisited at the next revision of HNF-14038. There are no technical issues with the LLD determination for calorimeters AR-1, AR-5, P-13, P-14 and Q-1 and the Room 172 SGSAS at PFP.

Table 9. LLD Values for Five Calorimeters

Calorimeter Number	LLD in Watts	LLD in WG Pu
AR-1	0.0063	2.52
AR-5	0.0059	2.36
P-13	0.0145	5.80
P-14	0.0082	3,28
Q-1	0.0102	4.08

(5) EPA replicate testing of the PFP calorimeters was performed and evaluated.

The purpose of the replicate testing performed as part of this inspection is to provide the EPA with an independent means to verify that the calorimeters listed above in conjunction with the Room 172 SGSAS for isotopic determinations can provide reproducible results for the determination of the quantity of ten WIPP-tracked radionuclides (^{241}Am, ^{137}Cs, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{90}Sr, ^{233}U, ^{234}U, and ^{238}U) and the TRU alpha concentration. This is accomplished by reassaying containers previously measured on the same systems in order to demonstrate the following the system's ability to do the following:

- Produce results consistent with the reported TMU by comparing the sample standard deviation for a number of replicate measurements taken over several hours or days to the reported TMU; and
- Provide reproducible results over longer periods of time, such as weeks or months, by comparing the results of the replicate measurement(s) to the original reported values.

As part of the evaluation of the calorimeter/SGSAS assay systems, EPA requested that Hanford reassay one container that EPA randomly selected from a list of containers previously assayed on calorimeters AR-1, AR-5, P-13, P-14 or Q-1, in conjunction with an isotopic determination on the Room 172 SGSAS. EPA chose container No. WIPP-06-12-014 which was reassayed three times on calorimeter P-13 and the resulting data were analyzed using two statistical tests, a *Chi-Squared (χ^2) Test* and a *t Test*, as discussed for the SHENCA and GEA-A and GEA-B units, above. Data and results of the statistical analysis are included in Attachments B.9 and B.10.

The χ^2 test for WIPP-06-12-014 showed *Highly Significant* differences for a single radionuclide, ^{238}Pu. The observed variances in the replicate measurements or all other radionuclides and TRU Alpha Activity Concentration are less than or equal to the reported uncertainties within the statistical limits of the test. The *t* test for this container did not show any statistically significant differences between the original measurement assay value and the average of the three replicate measurements for the activities of any of the target radionuclides or the TRU Alpha Activity Concentration. There are no technical issues with regard to replicate testing for the WRAP SHENCA.

Summary of NDA Findings and Concerns

The EPA inspection team did not identify any findings related to NDA during this inspection. EPA did identify one concern related to the SHENCA NDA system at WRAP that is discussed above. A copy of the EPA Inspection Issue Tracking Form documenting this issue is provided in Attachment C.3 of this report. EPA considers the concern to have been adequately addressed and there are no open findings or concerns related to NDA at WRAP or PFP resulting from this inspection.

Proposed Baseline Approval

The baseline conditions that the EPA inspection team evaluated during this inspection consist of the following NDA systems, as described in this report:

- GEA Units A and B for gamma-based assays of CH retrievably-stored debris (S5000) wastes and heterogeneous solid (S3000) in 55-gallon and 85-gallon drums as described above and detailed in the GEA Checklist (Attachment A.2 to this report) over the system's operational range from 0.135 g to 245 g (GEA-A) and 0.135 g to 260 g (GEA-B) of nominal WG Pu (6% ^{240}Pu) at sample densities between 0.011 and 1.56 g/cm^3 for quantitative assays and relative determinations (isotopics) in support of neutron-based measurements on the IPAN Units
- IPAN Units A & B for active and passive neutron-based quantitative assays and isotopic determinations as described above and detailed in the IPAN Checklist (Attachment A.3 to this report) over the system's calibrated mass range of LLD to 240 g WG Pu (Passive Mode) and LLD to 42.72 g WG Pu (Active Mode) in accordance with the MOD and ABSMOD ranges specified in BII-5142-CTR-001 in conjunction with isotopic determinations from the GEA Units
- SHENCA system for assays of CH retrievably-stored debris (S5000) wastes and heterogeneous solid (S3000) in Standard Waste Boxes based on $^{240}Pu_{EFF}$ using measured isotopic distributions from the SGEAS gamma component as described above and detailed in the SHENCA checklist (Attachment A.4 to this report) over the system's operational range of 0.36 g to 30.1 g $^{240}Pu_{EFF}$ for neutrons and 121.8 keV to 1121.1 keV for the absolute gamma mode over an AaS correction factor range of 0.94 to 3.6

- PFP Calorimeters AR-1, AR-5, P-13, P-14 and Q-1 in conjunction with isotopics derived on the Room 172 SGSAS as described above and detailed in the Calorimetry Checklist (Attachment A.5 to this report) for the measurement of Pu-bearings items within the range of 0 to 1.2 Watts (equivalent to 0 to 190 g WG Pu).

EPA has approved each system, along with its range of applicability for disintegration rate (activity) and matrix and any limitations, as described in this report and detailed in the NDA checklists (Attachments A.2 through A.5 to this report). The use of NDA equipment other than the systems described in this report, or physical modifications to these systems, is a T1 change (see Table 1 where this is included as a T1 change). This is discussed in the following section.

Proposed NDA Tiers

Based on the inspection and the results discussed above, EPA assigns the following tiers:

T1 NDA changes require EPA review and approval prior to implementation. They include the following:

- New NDA equipment[12]
- Physical modifications to approved equipment[13]
- Extension or changes of an approved calibration range(s) for approved equipment

The last bulleted item above refers to the extension of a system's approved calibration range with respect to determination of the disintegration rate (activity) or physical characteristics (matrix) of any of the two NDA systems approved as a result of this inspection. An EPA technical inspection involves the evaluation of several characteristics of a measurement system. A key characteristic is the range of conditions for which the instrument is capable of producing technically defensible data with respect to the following two aspects:

- Activity—the nuclear disintegration rate of specific radiation types (neutron or gamma), typically special nuclear material or TRU radionuclides; units of activity and mass are interchangeable
- Physical characteristics—the physical attributes of waste matrices as they relate to a radiometric system (i.e., how the matrix's physical properties interact with the radiations that originate within the sample and affect the system's ability to detect them); examples include attenuation of photons (gamma) and moderation and absorption of neutrons

[12] New NDA equipment refers to a system or component not previously evaluated by EPA. Specifically, this is defined as a physically distinct or different system or apparatus; an assay system that is reported to be the equivalent of or identical to a previously approved system, but which has not been formally inspected and approved by EPA, is a new system and must be approved by EPA prior to implementation to characterize WIPP wastes.

[13] Changes to existing NDA equipment include all changes and/or modifications to approved equipment that have the potential to affect the quality of NDA data used for the purposes of WC and/or waste isolation. This does not include minor changes or safety-related changes (e.g., addition of handrails) that do not have the potential to affect WC data.

During the inspection, the system's technical capabilities being evaluated represent the conditions observed, and they define the operational envelope in which WIPP measurements will occur. Changes to a system's calibrated range with respect to disintegration rate and/or matrix may represent an essentially different set of conditions from those evaluated during the inspection. For this reason, a change to a system's calibrated range is considered a T1 change. A system's operating range is generally, but not always, a subset of a calibration range; that is, systems that are calibrated to make valid neutron measurements from 0.36 g to 30.1 g $^{240}Pu_{EFF}$ may operate in a subset of this range. This typically occurs when a system is calibrated for MC&A (Safeguards) measurements as well as for WIPP assays, as is the case with the WRAP SHENCA. Provided the system's calibrated range is valid, a site can designate a different operating range(s) within the calibrated range as a T2 change (i.e., a subset of the calibrated range).

Similarly, for physical characteristics NDA systems are often calibrated with respect to a range of sample attributes—for example, a matrix density range upper limit of 1.56 g/cm^3 for the GEA Units or an AaS matrix correction factor range of 0.94 to 3.6 for the SHENCA system discussed earlier in this report. This range may include materials that are commonly referred to using terms such as "debris (S5000)" and "solids (S3000)," both of which are within the calibrated density and AaS ranges. Actual waste assays may be restricted to a portion or subset of this range (i.e., debris only, for a variety of technical and/or administrative reasons). Changing the calibrated range by extending the density range beyond 1.56 g/cm^3 for either of the GEA Units or the AaS range beyond 0.94 to 3.6 for the SHENCA would constitute a T1 change. Provided the original density range is valid, changing the operational range(s) of an approved NDA system—that is, decreasing it relative to the originally approved density range—is a T2 change, as discussed below.

Hanford will report and submit documentation for T1 changes when it is ready for EPA review. In the case of the first two T1 NDA changes listed above, DOE should assume that an EPA inspection is likely. In the case of the last T1 NDA change, EPA will inform Hanford and CBFO whether a site inspection is necessary. EPA may request additional information, choose to conduct a desktop review, and/or confer with Hanford NDA personnel. Upon evaluation (with or without site inspection), EPA will issue an approval letter and only upon receiving the EPA approval can Hanford continue to use the equipment affected by the change.

T2 NDA changes do not require prior EPA approval but do require Hanford to notify EPA upon implementation of such changes and submit a brief description of the changes. These include the following:

- Changes to software for approved equipment
- Changes to the approved operating range(s) of approved NDA systems upon CBFO approval (see discussion above)
- Changes to procedures that require CBFO approval

Examples of the first bulleted item above would include the following:

- Changing a system's operating system (e.g., first use of NDA 2000, MGA or PCFRAM)
- Identification of a systematic problem with a software package and subsequent modifications to address the problem, (e.g., use of an incorrect value for a radionuclide's transition probability or branching ratio in the data reduction software)
- Introduction of a new version of an existing software package beyond what is in currently use

Regarding the second bulleted item above, reducing a system's operating range because of performance-related problems or equipment failure would be a T2 change. For example, if the SHENCA failed to pass a PDP cycle for a specific matrix or activity range and its use for those were formally restricted by the site or CBFO, this would be a T2 change.

Any changes to the WC activities from the date of the baseline inspection must be reported to and approved by EPA according to Table 1. Following EPA approval, Hanford will provide EPA with information concerning T2 changes at the end of each fiscal quarter. EPA will evaluate these changes and communicate with Hanford as to whether the changes raise any concerns and require a Hanford response, or whether Hanford can continue to implement the changes. Consistent with EPA's authority under 40 CFR 194.24(h) EPA may request information relative to these changes if EPA deems the information is necessary to ensure continued compliance with EPA regulations.

8.3 Real-Time Radiography

WC Element Description

As part of the inspection of the RTR activities, the team reviewed the elements of the RTR process listed below. Emphasis was placed on overall procedural technical adequacy and implementation, and identification of waste material parameters and prohibited items:

- Documentation of RTR activities through use of an approved procedure
- Proper execution of RTR activities
- Management oversight and independent review of RTR activities
- Training of RTR personnel

The RTR facility uses radiography to help determine the following aspects of TRU waste characterization:

- Types and amounts of waste material parameters (WMP)
- Presence or absence of prohibited items
- Testing for new operators on the RTR system using specifically placed items

Hanford has two RTR units used for examination of 55-gallon and 85-gallon drums and one unit for examination of SWBs. The WIPP identification numbers for these instruments are: 2RR1 -

Drum RTR Unit, referred to as Vault A; 2RR2 - Drum RTR Unit, referred to as Vault B; and 2RR3 - SWB unit.

Documents Reviewed

The following documents were among those examined to assess whether all RTR operations follow the appropriate approved procedures:

- WMP-400, Section 1.2.2, Revision 20, TRU Training and Qualification Requirements, March 12, 2007
- WMP-400, Section 7.1.6, Revision 19, TRU Waste Project Level Data Validation and Verification, April 11, 2007
- WMP-350, Section 2.3, Revision 23, Data Management, March 12, 2007
- WRP1-OP-0908, Revision I, Change 9, Operation of the Drum Nondestructive Examination System, December 28, 2006
- WRP1-OP-0909, Revision E, Change 0, Operation of the Box NDE System, April 25, 2007
- HNF-2600, Revision 19, Hanford Site Transuranic Waste Certification Plan, March 22, 2007

A complete listing of all objective evidence that was evaluated during the inspection is provided below.

- RTR Batch Data Report for SWB: WR-TB-2007-091, WR-TB-2007-093 (S5000, debris waste)
- RTR Batch Data Report for drums: WR-TB-2007-060, WR-TB-2007-069, WR-TB-2004-297, WR-TB-2005-177 (S5000, debris waste)
- RTR Batch Data Report for drums: WR-TB-2007-089, WR-TB-2007-098 (S3000, solid waste)
- Audio/visual recording of RTR events for selected drums and SWBs from the above BDRs
- Written record of capability demonstration for drum RTR operators, RTR Biannual Completed February 2007
- Capability demonstration audio/visual recordings for selected operators
- S3000 drum status, including documentation of venting at T-Plant
- Drum Venting Container Checklist for Drum Nos. 0005398, 0005418, 0005654, 0005771, 0005833
- TRUEDMT screen print for container 0005910 showing reason container rework is “Needs T Plant Drilling”
- Training Bulletin TB-T-07-004, Revision 1
- Training Bulletin TB-T-07-001, Revision 0

- Nonconformance Reports (NCR): TRU-WRP-07NCR-078, TRU-WRP-07NCR-052, TRU-WRP-07NCR-070, TRU-WRP-06NCR-126

Technical Evaluation

During the inspection, the following technical elements of the RTR process were investigated (see Attachment A.6):

(1) Overall procedural technical adequacy and implementation.

EPA reviewed both of the RTR procedures, WRP1-OP-0908 and WRP1-OP-0909, and determined that they were technically adequate. The procedures contained specific information on performing non-intrusive radiography, including operational set-up and check-out, identification of prohibited items, assignment of waste material parameters and estimation of weights and volumes, confirmation of waste matrix codes, data input, and issuance of non-conformance reports. Technical and project level review of radiography results are performed in accordance with procedures WMP-350, Section 2.3 and WMP-400, Section 7.1.6.

The drum RTR units at Hanford have the ability to generate a linear diode array image (LDA) that provides a static view of the entire contents of each drum. Two images, 90^{o} apart, are recorded for each drum. This is a useful tool for the operators as they normally only "see" part of each drum at any one time. Although the LDA images are not included in batch data reports (BDR), they are stored electronically and are available for review at anytime.

During the onsite inspection, EPA observed the RTR event for Drum No. 0039934 and SWB No. 0013133, both of which contained S5000 debris. EPA also reviewed previously generated BDR and audio/visual recordings for both drums and SWBs and determined that procedures WRP1-OP-0908 and WRP1-OP-0909 were implemented as written. Notification to EPA upon implementation of new equipment or substantive changes to approved RTR equipment is a T2 change. Consistent with EPA's authority under 40 CFR 194.24(h), EPA may request this information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.)

(2) Characterization of WMPs and prohibited items.

Both the drum and SWB RTR procedures require that the radiography audio/visual recording equipment be verified at the beginning of every shift. This check is achieved by viewing a line-pair resolution test gauge and ensuring that the image meets the minimum requirement.. Adherence to verification requirements was confirmed through interviews with RTR operators, observation of the Image Quality Indicator (LQI) processing for batch WR-TB-2007-126 during the on-site inspection, and review of video/audio recordings for WR-TB-2007-060, WR-TB-2007-098, WR-TB-2007-089, WR-TB-2007-095, WR-TB-2007-093, and WR-TB-2007-069. Operators for the drum and SWB RTR units had hard copies of the waste stream description for the waste streams being processed available for review. The operators were able to explain how they answered questions on the RTR Data Sheet with regard to waste stream description and

WMC. Typically, training for each waste stream is provided in a training bulletin, for example, training bulletin TB-T-04-001 provided training to operators for waste stream RLM233SD. Additionally, operators had electronic access to all waste stream descriptions.

For each container undergoing examination, an audiovisual recording of the RTR event is made. During the on-site inspection, EPA observed the RTR event for drum No. 0039934 and SWB No. 0013133, both of which were S5000 debris waste containers. The first notations made on the audio/video recording by the operator were the drum/SWB number and the date and time. For all drums, including the demonstration drum No. 0039934, the examination began at the top drum lid where the operator identified the seal and vent. The drum was rotated through at least 360 degrees, so that all objects were viewed from all sides. The operator then moved down the drum in set increments that are specified in the procedure. The operator zoomed both in and out and increased or decreased the scan energy in order to compensate for varying densities in the material examined.

During examination, the operator also "jogged" the drum to determine the presence of free liquids. For all SWBs, including the demonstration SWB #0013133, the operator examined the box from both sides, designated as side A and B. On each side, the operator scanned across the container at depths (y-axis) that were designated in procedure WRP1-OP-0909, Attachment 7. During the examination, the operator zoomed both in and out and increased or decreased the scan energy in order to compensate for varying densities in the material examined. The SWB RTR unit has a "shake" button that moves the SWB so that the operator can verify the presence or absence of prohibited liquid.

The operator/ITRs successfully identified all of the prohibited items contained in the training SWB and drum. However, Hanford could not provide complete inventories for the training containers to enable EPA to verify that all WMPs, in particular cellulosics, plastic, and rubber were identified by the operators. This concern was discussed with Hanford AK personnel and EPA included it on an EPA Inspection Issue Tracking Form (See Attachment C.6 of this report for a copy of this form) and it is discussed below.

EPA Inspection Issue Tracking Form, Issue No. HAN-RTR-07-006CR: All the contents of the SWB that is used for the biannual capability demonstration for RTR operators are not documented. The SWB does contain items required by Appendix A of WMP-400, Section 1.2, R.20 and those requested by the site from work order W1-07-00182/0 but the remaining items in the SWB are unknown. Without a comprehensive listing of the SWB's contents, EPA was unable to verify that the RTR operators had identified all of the cellulosics, plastics and rubber items in the training container. The same situation exists for the RTR Training Drum No. 9903393.

Resolution: Hanford has committed to preparing a new training drum and SWB for use in their next training cycle. EPA understands that this corrective action will be implemented in a timely and expeditious manner.

Status of Concern: EPA considers this issue closed.

WMPs were identified by the operator and data were entered into a RTR Data Sheet electronically. At the end of the examination, the operator estimated the weight of each WMP recorded and ensured that the total WMP weight was the same as that obtained by weighing the container. Most weights recorded were estimates, although Table 1 of the drum procedure contains historically derived weights for some common items. The absence of prohibited items was recorded on the data sheet. EPA further verified this by review of previously recorded written and audio/visual records. Procedure WRP1-OP-0909, Attachment 4 contained an equation used to calculate the volume of cylinders. The operator interviewed stated that no record is kept of this calculation when used for determining if an amount of liquid meets the prohibited item criteria. This concern was discussed with Hanford AK personnel and EPA included it on an EPA Inspection Issue Tracking Form (See Attachment C.4 of this report for a copy of this form) and it is discussed below.

EPA Inspection Issue Tracking Form, Issue No. HAN-RTR-07-004CR: Attachment 4 of Procedure WRP1-OP-0909, Revision E, Change 0, provides a calculation equation for liquid in cylinders. The result of this equation is used to assess if an amount of liquid in an SWB meets the criterion for a prohibited item. The procedure does not require the calculation to be documented and it is not available fore independent review.

Resolution: Hanford personnel stated that Procedure WRP1-OP-0909 will be revised to require that the calculation is documented in such a way that it can be independently verified.

Status of Concern: EPA considers this issue closed.

Notification to EPA upon completion of changes to site procedures for RTR requiring CBFO approval is a T2 change. Consistent with EPA's authority under 40 CFR 194.24(h), EPA may request this information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.)

(3) Documentation of radiography activities was examined.

Simultaneous audio descriptions and video recordings are made as the waste is examined. These data are also recorded on the electronic data sheets and hard copies are provided in the BDRs. This was observed by the EPA Inspector during the examination of two waste containers during the on-site inspection and further verified by review of selected RTR BDRs and audio/visual recordings:

- WR-TB-2007-095, SWB 0013132, original and replicate (S5000)
- WR-TB-2007-093, SWB RHZ-219-940001 (S5000)
- WR-TB-2007-060, drum 24-01 and 26-11 (S5000)
- WR-TB-2007-069, drum 0037923 (S5000)
- WR-TB-2007-089, drum 5625 (S3000)
- WR-TB-2007-098, drum 005921 (S3000)

In all cases the information on the audio/visual recording matched the written RTR record (batch data report).

(4) Adequate documentation of radiography procedures was ascertained.

Radiography procedures are well defined and the documents are controlled. During the inspection, EPA reviewed the adequacy and implementation of all radiography-related procedures. QC examinations were performed as required by the procedure. In batch WR-TB-2007-069 (drum, S5000), an independent observation was performed on container 0037633 and a replicate scan was performed on container 0037676. In batch WSR-TB-2007-089 (drum, S3000) an independent observation was performed on container 0006981 and a replicate scan was performed on container 0007026. In batch WR-TP-2007-095 (SWB, S5000), an independent observation was performed on container 0014593 and a replicate scan was performed on container RHZ-219-940001. Different operators performed the original and the QC replicates.

Non-Conformance Reports (NCRs) are generated as needed. For example, NCR No. TRU-WRP-07NCR-052 was initiated for drum 23-05 because of the presence of a pressurized container and TRU-WRP-07-07NCR-078 was initiated for container 9608025 because the waste did not match the waste stream description. TRU-WRP-07-06NCR-126 was initiated for drum 0032897 because of the presence of liquid greater than 1".

The BDRs evaluated during the inspection reviewed had been reviewed at the data generation level (ITR) and project level (SPM) as required and the completed review checklists were contained in the BDRs.

(5) Training of radiography personnel was adequate.

During the inspection, EPA reviewed the records of the capability demonstration for selected radiography personnel. The audio/visual recordings for the latest capability demonstration container for both drum and SWB RTR operator/ITRs were viewed during the inspection. Review of training performance is the responsibility of an NDE Supervisor. Training records reviewed indicated that only trained personnel were operating the RTR equipment. Training records were complete and filed correctly for viewing and reference. The records reviewed include:

- Radiography Data Sheet for capability demonstration SWB for an operator, dated May 3, 2007
- Biannual Training Results for Non-Destructive Examination, NDE Supervisor Review/Findings Report, January 22, 2007
- Audio/visual recording of drum RTR capability demonstration for operator, dated January 4, 2007

- Audio/visual recording of SWB RTR capability demonstration for operator, dated May 7, 2007
- Inventory for training SWB and drum

Summary of RTR Concerns and Findings

The EPA inspection team did not identify any findings related to RTR during this inspection. The EPA inspection team identified the two concerns related to RTR that are discussed above. Copies of the EPA Inspection Issue Tracking Forms documenting these concerns are provided in Attachments C.4 and C.6 of this report. EPA considers these concerns to have been adequately addressed and there are no open findings or concerns related to RTR resulting from this inspection.

Proposed Baseline Approval

The baseline conditions that the EPA inspection team evaluated during this baseline inspection consisted of the following:

- Trained personnel: Drum and SWB RTR operators/ITR and SPM
- Approved and controlled operating procedures: WMP-400, Section 1.2.2, Revision 20; WMP-350, Section 2.3, Revision 23; WMP-400, Section 7.1.6, Revision 19; WMP-350, Section 2.3, Revision 23; WRP1-OP-0908, Revision I, Change 9; WRP1-OP-0909, Revision E, Change 0
- Drum RTR Units WIPP Nos. 2RR1 and 2RR2 for S3000 (solids) and S5000 (debris) wastes
- SWB RTR Unit WIPP No. 2RR3 for S5000 (debris) wastes
- RTR records and supporting data: RTR electronic data recording forms, ITR and SPM review checklists, and RTR BDRs.

The drum RTR system is suitable for S5000 (debris) and S3000 (solid) wastes and the SWB RTR system is suitable for S5000 (debris) wastes.

Proposed RTR Tiers

Based on the inspection and the results discussed above, EPA proposes to assign the following tiers.

Tier 1 RTR changes: None

Tier 2 RTR changes that do not require EPA approval prior to implementation but require reporting and submission of documentation discussing changes by Hanford include the following:

- New RTR equipment or modifications to approved equipment
- Changes made to RTR procedure(s) that require CBFO approval

Every three months from the date of EPA approval, Hanford will provide information concerning T2 changes. If new RTR equipment is in use, EPA inspection may be necessary. EPA will evaluate changes and communicate with Hanford whether the changes raise any concerns and require Hanford response, or whether Hanford can continue to implement the changes.

8.4 Visual Examination

Hanford performs two types of visual examination, specifically VE in lieu of RTR and VET. VE is used for examination of retrievably-stored waste if RTR is unable to successfully characterize the waste or if a generator/storage site prefers to perform VE, as discussed in Section 8.4.1. VET is performed during packaging/repackaging of waste, i.e., for newly-generated waste, and is discussed in Section 8.4.2.

8.4.1 VE in Lieu of RTR

WC Element Description

The VE process for retrievably-stored waste uses manual examination to determine the following aspects of TRU Waste Characterization:

- Confirmation of WMP and WMC
- Confirm presence or absence of prohibited items

Procedure WRP1-OP-0729 is used for VE in lieu of RTR in the WRAP. At the time of the inspection, Hanford was not performing any VE activities and could not demonstrate this process. However, EPA used audio/visual records of previous VE events as objective evidence to document complete and effective implementation of procedure WRP1-OP-0729. EPA determined that the VE procedure contained sufficient information and instructions for VE technicians to generate the required VE data.

Documents Reviewed

The following documents were among those reviewed to assess whether VE operations follow the appropriate approved procedures and meet VE requirements:

- WRP1-OP-0729, Revision C, Change 1, Visual Examination, March 12, 2007
- WMP-400, Section 7.1.3, Revision 5, Transuranic Waste Repackaging, Visual Examination, and Sampling, March 12, 2007
- WMP-400, Section 1.2.1, Revision 18, TRU Training and Qualification Plan, March 12, 2007
- WMP-400, Section 1.2.2, Revision 20, TRU Training and Qualification Requirements, March 12, 2007

- WMP-400, Section 7.1.6, Revision 19, TRU Waste Project Level Data Validation and Verification, April 11, 2007
- WMP-350, Section 2.3, Revision 23, Data Management, March 12, 2007
- HNF-2600, Revision 19, Hanford Site Transuranic Waste Certification Plan, Appendix H-1, March 22, 2007

A complete listing of all objective evidence that was evaluated during the inspection is provided below.

- Batch Data Reports: VE-TB-2006-293, VE-TB-2006-291
- Audio/visual recording for BDRs VE-TB-2006-293, VE-TB-2006-291
- TRU Project Employee Job Analysis for WRAP glove-box operator and three VEEs
- TRU VE Expert/Technician OJT Qualification Card for two VEEs
- Re-certification memo, dated 8/22/06, for three VE Expert/VE Technician

Technical Evaluation

During the inspection, the technical elements of the VE process were evaluated using the checklist contained in Attachment A.7. These areas are summarized below:

(1) Overall procedural technical adequacy and implementation

The visual examination procedure, documented in WRP1-OP-0729, Revision C, Change 1, contained specific instructions for performing visual examination, including operational set-up and check-out, scale calibration verification, identification of prohibited items, assignment of waste material parameters and determination of weights and volumes, confirmation of waste matrix codes, input of data, and issuance of non-conformance reports. EPA determined that the VE procedure contained sufficient information and instructions for VE technicians to generate the required VE data.

The EPA inspection team had one concern related to the replicate weighings that are used to assess precision. This concern was discussed with Hanford AK personnel and EPA included it on an EPA Inspection Issue Tracking Form (See Attachment C.5 of this report for a copy of this form) and it is discussed below.

EPA Inspection Issue Tracking Form, Issue No. HAN-VE-07-005CR: Procedure WRP1-OP-0729, Revision C, Change 1, Section 5.9.10 requires that at least one replicate weighing be performed per VE event to assess precision. This activity is performed but there are no acceptance limits or criteria assigned to the replicate weighings. Without acceptance limits to define the weighing precision, the site cannot demonstrate that the required precision has been achieved.

Resolution: Hanford personnel responded to this concern by stating that this requirement is a self-imposed, and that it would be removed from WRP1-OP-0729

Status of Concern: EPA considers this issue closed.

Notification to EPA upon completion of changes to site VE in lieu of RTR procedures requiring CBFO approval is a T2 change. Consistent with EPA's authority under 40 CFR 194.24(h), EPA may request this information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.)

(2) Characterization of WMPs and prohibited items was evaluated.

The VE process used at Hanford consists of emptying container contents onto a sorting table located within a glove box. The operators sort the waste into packages, grouping the same WMP into each package. There may be multiple packages for the same WMP. The packages are labeled, weighed and deposited into the "new" receiving drum. At the same time these activities are being performed, VE data are recorded on data sheets and an audio/visual recording is made of the entire process.

At the time of the inspection, Hanford was not performing any VE activities and could not demonstrate this process. However, EPA used audio/visual records of previous VE events to verify complete and effective implementation of procedure WRP1-OP-0729. EPA concurrently reviewed the audio/visual recording with the written BDR record listed below to ensure that the data contained in both were the same. EPA did not identify any discrepancies. By review of the audio/visual recordings EPA also verified that image quality checks were performed as required.

- Batch Data Report VE-TB-2006-291 (S5000)
- Audio/visual recording for BDR VE-TB-2006-291
- Batch Data Report VE-TB-2006-293 (S5000)
- Audio/visual recording for BDR VE-TB-2006-293

WMPs were identified and recorded as required and the Waste Matrix Code (WMC) was verified. The absence of prohibited items was recorded for each container in the above batches. The calibration and correct function of the scale used to weigh WMPs was verified prior to weighing.

The addition of a new SCG or waste stream(s) is a T2 change. Consistent with EPA's authority under 40 CFR 194.24(h), EPA may request this information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.)

(3) Documentation of VE activities was examined.

EPA reviewed data packages listed in (2) above to verify that the VE data were documented correctly and completely. The form used for data entry is Visual Examination Drum Log

(Attachment 1 of WRP1-OP-0729). The drum logs reviewed were complete, recorded WMPs weights, verified the waste stream and WMC, and were signed as required. Audio/visual recordings are made of the VE events and the recordings for BDRs listed above were also viewed to ensure consistency of the recorded data. Table 1 in the procedure, Historically Derived Weight Estimates, contains standardized weights for items commonly found in the waste streams examined. Waste packages were weighed on a calibrated scale. Non-conformance reports (NCR) were initiated when needed. For example, NCR TRU-WRP-06NCR-130 was written to address a WMP weight problem identified for container 2777-56 in BDR VE-TB-2006-291. All reviewed data packages were correctly completed and had been reviewed at both the data generation and project level.

(4) Training for VE personnel was examined.

Hanford's TRU Project Employee Job Analysis documents the training and reading required to qualify VE operators and VEEs. Qualification Cards record training completed and the date of completion. The following records were reviewed:

- TRU Project Employee Job Analysis for WRAP glove-box operator and three VEEs
- TRU VE Expert/Technician OJT Qualification Card for two VEEs
- Re-certification memo, dated August 22, 2006, for three VE Expert/VE Technician

All records were readily retrieved and were complete. Training records confirmed that only qualified personnel are used to perform VE in the WRAP facility.

Summary of VE Concerns and Findings

The EPA inspection team did not identify any findings related to VE during this inspection. EPA did identify the one concern related to VE that is discussed above. A copy of the EPA Inspection Issue Tracking Form documenting this concern is provided in Attachment C.5 of this report. EPA considers the concern to have been adequately addressed and there are no open findings or concerns related to VE resulting from this inspection.

Proposed Baseline Approval

The system used for container certification that was evaluated during this baseline inspection consisted of the following:

- Trained personnel—VE operators, VEEs, and SPM
- Approved and controlled operating procedures — WRP1-OP-0729, Revision C, Change 1; WMP-400, Section 7.1.3, Revision 5; WMP-400, Section 1.2.2, Revision 20; WMP-400, Section 7.1.6, Revision 19; WMP-350, Section 2.3, Revision 23
- VE records and supporting data — electronic VE data form; WMP-400, Section 7.1.6 review checklists; VE BDRs

VE in lieu of RTR is suitable for S5000 debris waste.

Proposed VE Tiers

Based on the inspection and the results discussed above, EPA proposes to assign the following tiers.

Tier 1 VE changes: None at this time.

Tier 2 VE changes that do not require EPA approval prior to implementation but require reporting and submitting documentation include the following:

- Changes made to VE procedure(s) that require CBFO approval
- Addition of new Summary Category Group (SCG) waste stream(s)

Every three months from the date of EPA approval, Hanford will provide information concerning T2 changes. EPA will evaluate changes and communicate with Hanford whether the changes raise any concerns and require Hanford response, or whether Hanford can continue to implement the changes.

8.4.2 Visual Examination Technique

WC Element Description

There are three VET processes used in the PFP to determine the following aspects of TRU Waste Characterization:

- Confirmation of WMP and WMC
- Confirm presence or absence of prohibited items

Procedure ZO-170-044 is used to load waste into SWBs, procedure ZO-170-057 is used to perform VET on product receiver (PR) cans, and procedure ZO-160-080 is used to package waste into billet cans which are then loaded into pipe over-pack containers (POC). At the time of the inspection, there were no VET activities being performed at PFP but Hanford personnel demonstrated the above three processes as mock-ups. Previously generated VET BDRs were also used by EPA to ensure complete and effective implementation of the site VE procedures. EPA determined that the VET procedures contained sufficient information and instructions for VET operators to generate the required VET data.

Documents Reviewed

The following documents were among those reviewed to assess whether VE operations follow the appropriate approved procedures and meet VE requirements:

- ZO-170-044, Load Standard Waste Box (SWB) Storage Containers with TRU Waste, March 7, 2007

- ZO-170-057, Revision C, Change 8, Visual Examination Technique for PFP Debris Waste, January 3, 2007
- ZO-160-080, Revision C, Change 19, Pipe-N-Go Operations, March 28, 2007
- WMP-400, Section 7.1.10, Revision 8, TRU Waste Visual Examination Technique, March 12, 2007
- WMP-400, Section 1.2.2, Revision 20, TRU Training and Qualification Requirements, March 12, 2007
- WMP-400, Section 1.2.1, Revision 18, TRU Training and Qualification Plan, March 12, 2007
- WMP-400, Section 7.1.6, Revision 19, TRU Waste Project Level Data Validation and Verification, April 11, 2007
- FSP-PFP-5-8, Volume 2, 16.2, Revision 14, Change 0, Data Management
- 2Z05-2127, Attachment A, Revision A, Change 0, Waste Container Scale Control Check
- HNF-2600, Revision 19, Hanford Site Transuranic Waste Certification Plan, Appendix H-1, March 22, 2007

A complete listing of all objective evidence that was evaluated during the inspection is provided below.

- TRU Project Personnel Summary for three (3) VET operators
- TRU Visual Examination Technique Personnel Qualification Card for one (1) NCO
- List of trained "PFP D&D VE Technique Personnel" for procedure ZO-160-080
- List of trained "PFP D&D VE Technique Personnel" for procedures ZO-170-044 and ZO-170-057
- WMP Training Bulletin TB-T-001, Acceptable Knowledge Documentation Management, Plutonium Finishing Plant Waste Stream NPFPD
- WMP Training Bulletin TB-T-99-003, Acceptable Knowledge Documentation Management, Plutonium Finishing Plant Waste Stream MPFPD
- Batch Data Reports: PFP-VE-2006-046, PFP-VE-2006-055, PFP-VE-2006-065, PFP-VE-2007-002

Technical Evaluation

During the inspection, the technical elements of the VE process were evaluated using the checklist contained in Attachment A.7. These areas are summarized below:

(1) Overall procedural technical adequacy and implementation

The visual examination technique procedures, documented in ZO-170-044, ZO-170-057 and contained ZO-160-080, contain specific instructions for performing VET including scale

calibration verification, identification of prohibited items, assignment of waste material parameters and determination of weights and volumes, confirmation of waste matrix codes, and recording of VET data. EPA determined that the VET procedures contained sufficient information and instructions for VET technicians (Nuclear Chemical Operator or NCO) to generate the required VET data. Notification to EPA upon completion of changes to site VET procedures requiring CBFO approval is a T2 change. Consistent with EPA's authority under 40 CFR 194.24(h), EPA may request this information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.)

(2) Characterization of WMPs and prohibited items was evaluated

EPA observed a demonstration of procedure ZO-160-080 in PFP, Building 234-5, Room 336. The demonstration was performed in the training glove box which was not set up to be operational in that gloves were not attached to the box. However, Hanford was able to successfully demonstrate the VET process using an inorganic absorbent material. An NCO read aloud from the applicable procedure so that a VET technician could perform the actions required by the procedure. A second VET operator recorded VET data as they were generated. WMPs were identified and weighed on a calibrated scale and prohibited items were identified and recorded as required by the procedure.

Procedure ZO-170-057 was demonstrated to EPA for product receiver (PR) Can No. 871. The demonstration took place in Room-172 of PFP Building 234-5. The PR cans were used to transport liquid plutonium nitrate in the 1980s and are now considered to be waste items. VET was performed to verify the absence of liquid. During the demonstration, the required data sheets were completed as required by the procedure.

Hanford personnel demonstrated the packaging of PR Can No. 871 into SWB 0037384 by implementing procedure ZO-170-044. As with procedure ZO-160-080, an NCO read aloud from the applicable procedure so that a VET technician could perform the actions required by the procedure. A cradle was used in the SWB to stabilize the PR Can and the cradle WMP components were correctly recorded. WMPs were initially recorded as percentages and the absence of prohibited items was recorded. It is Hanford's normal practice to load two PR cans in each SWB and consider them "full" with a fill factor of 70%. Filled and sealed SWBs are weighed, which allows the WMP weights to be calculated from the assigned percentages. The EPA inspection team noted that the scale lacked acceptance criteria (acceptable tolerances). This was discussed with VE personnel and EPA included it on an EPA Inspection Issue Tracking Form (See Attachment C.7 of this report for a copy of this form) and it is discussed below.

EPA Inspection Issue Tracking Form, Issue No. HAN-VET-07-007CR: Scale No. 840-66-06-010 within the PFP is used to weight SWBs. This scale is checked before use with items of known weight, however the acceptability of the scale's operation cannot be verified because Work Plan 2Z-05-2127, Attachment A does not provide acceptance ranges for the weights used. As stated, the work plan requires only that the check be performed but is silent regarding the scale's acceptable tolerance.

Resolution: Hanford personnel stated that a tolerance of ± 4 kg for the scale used to weigh SWBs will be incorporated in Procedure ZO-170-0444, Load Standard Waste Boxes (SWB) Surrogate Containers with TRU Waste.

Status of Concern: EPA considers this issue closed

EPA also reviewed BDRs to ensure that WMPs were identified and weighed, and the absence of prohibited items was confirmed:

- PFP-VE-2006-046: Procedure ZO-170-057 and ZO-170-044
- PFP-VE-2006-055: Procedure ZO-170-057 and ZO-170-044
- PFP-VE-2006-065: Procedure ZO-170-057 and ZO-170-044
- PFP-VE-2007-002: Procedure ZO-160-080

EPA determined that all the processes demonstrated were performed in accordance with the written procedures and the required VET data were appropriately recorded. Notification to EPA upon addition of new SCG(s) or waste stream(s) is a T2 change. Consistent with EPA's authority under 40 CFR 194.24(h), EPA may request this information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.)

(3) Documentation of VE activities was examined.

EPA reviewed data packages listed in (2) above to verify that the VE data were documented correctly and completely. The forms used for data entry are included in each procedure. The data sheets reviewed were complete, recorded WMPs weights, verified the waste stream and WMC, identified the absence/presence of prohibited items, and were signed as required. Waste items were weighed on a calibrated scale.

All reviewed data packages were correctly completed and had been reviewed at both the data generation and project level.

(4) Training for VE personnel was examined.

All of the operators performing the on-site demonstrations were designated as NCOs. Hanford's TRU Project Employee Job Analysis documents the training and reading required to qualify VET operators. Qualification Cards record training completed and the date of completion. The following records were reviewed:

- TRU Project Personnel Summary for three VET operators
- TRU Visual Examination Technique Personnel Qualification Card for one NCO
- List of trained "PFP D&D VE Technique Personnel" for procedure ZO-160-080

- List of trained "PFP D&D VE Technique Personnel" for procedures ZO-170-044 and ZO-170-057
- WMP Training Bulletin TB-T-001, Acceptable Knowledge Documentation Management, Plutonium Finishing Plant Waste Stream NPFPD
- WMP Training Bulletin TB-T-99-003, Acceptable Knowledge Documentation Management, Plutonium Finishing Plant Waste Stream MPFPD

All records were readily retrieved and were complete. Training records confirmed that only qualified personnel are used to perform VET in the PFP facility.

Summary of VET Concerns and Findings

The EPA inspection team did not identify any findings relative to VET during this inspection. EPA did identify one concern related to VET that is discussed above. A copy of the EPA Inspection Issue Tracking Form documenting this concern is provided in Attachment C.7 of this report. EPA considers the concern to have been adequately addressed and there are no open findings or concerns related to VET resulting from this inspection.

Proposed Baseline Approval

The system used for container certification that was evaluated during this baseline inspection consisted of the following:

- Trained personnel—Nuclear Chemical Operators (VET operators) and SPM
- Approved and controlled operating procedures — ZO-170-057, Revision C, Change 8; ZO-170-044, Revision F, Change 24; ZO-160-080, Revision C, Change 19; FSP-PFP-5-8, Volume 2, Section 16.2, Revision 14, Change 0; WMP-400, Section 7.1.10, Revision 8; WMP-400, Section 7.1.6, Revision 19
- VET records and supporting data — electronic VET data form; FSP-PFP-5-8, Volume 2, Section 16.2 review checklists; VET BDRs

VET is suitable for S5000 debris waste.

Proposed VET Tiers

Tier 1 VET changes: None at this time.

Tier 2 VET changes that do not require EPA approval prior to implementation but require reporting and submitting documentation include the following:

- Changes made to VET procedure(s) that require CBFO approval
- Addition of different Summary Category Group (SCG) waste stream(s)

Every three months from the date of EPA approval, Hanford will provide information concerning T2 changes. EPA will evaluate changes and communicate with Hanford whether the changes raise any concerns and require Hanford response, or whether Hanford can continue to implement the changes.

8.5 WIPP Waste Information System

WC Element Description

Hanford has successfully submitted waste characterization/certification data for numerous containers to WWIS in the past (see report for Inspection No. EPA-Hanford-05.06-08, June 2005, Docket No.A-98-49, II-A4-58). Procedure WMP-400, Section 7.1.5, Revision 17 is used to guide the submittal of both characterization and certification data to WWIS.

Documents Reviewed

The following documents were among those reviewed to assess whether WWIS operations follow the appropriate approved procedure and met WWIS requirements:

- WMP-400, Section 7.1.5, Revision 17, WIPP Waste Information System Data Entry and Reporting, January 24, 2007
- WMP-400, Section 1.2.2, Revision 20, TRU Training and Qualification Requirements, March 12, 2007

A complete listing of all objective evidence that was evaluated during the inspection is provided below.

- Waste Container Data Report for containers H-0027760 and H-4631560
- WWIS Characterization Data Report Verification Signoff Sheet for container H-0027760 (pre-submittal to Characterization Approval)
- Characterization data sheets for container 0027760
- WWIS Data Entry Personnel Training record and WCO training record
- TRUEDMT (container tracking and management electronic system) print-out for NCR TRU-WRP-07NCR-085
- List of data entry personnel and WCOs
- WWIS password request email for data entry person

Technical Evaluation

(1) Overall procedural technical adequacy was evaluated.

The WWIS procedure, documented in WMP-400, Section 7.1.5, is well defined and controlled and contains complete instructions for entering, reviewing, and transmitting data. Adequate

reviews are incorporated into the WWIS data entry procedure to minimize the transmittal of noncompliant or incorrect data. No adequacy issues were identified for this procedure. Notification to EPA upon completion of changes to WWIS procedure(s) requiring CBFO approval is a T2 change. Consistent with EPA's authority under 40 CFR 194.24(h), EPA may request this information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.)

(2) Implementation and documentation of WWIS activities were examined.

Personnel entering data into the WWIS can only do so after being granted access by the WWIS Administrator, and access is password protected. EPA observed manual data entry for container No. H-0027760 and interviewed the WCO and data entry personnel. Hanford personnel stated that they intend to develop an automatic upload process for container NDA and NDE data but completion of this aspect is not expected for at least a year. Containers that have open NCRs associated with them are identified during the data reconciliation process and do not progress to data entry until all NCRs are closed. However, if such a container is entered into WWIS, Hanford requests the WWIS data administrator to reset the data to pre-submittal and then the data can be deleted. After data entry, the data are reviewed and if acceptable sent to a WCO for review. Only after resolution of any discrepancies are the data transmitted to WWIS. Hanford uses the "TRUEDMT" electronic system for container tracking and management.

E-mails from WWIS informing the site if data has been accepted or rejected are not retained, but Hanford uses the waste container data report "Certification Data Approved by WIPP" to track the status of containers. If data are rejected by WWIS, an NCR is initiated to resolve the problem unless a simple data entry error had occurred.

A Waste Stream Profile Package that identifies the containers to be used for characterization is compiled and sent to CBFO for approval for a new waste stream. Characterization data are entered into the Characterization module of WWIS and are only transferred to the Certification module after final approval of the data by the WWIS administrator.

Data storage and retrieval were demonstrated. Hanford personnel were able to retrieve and print requested records, including WWIS access requests and waste container data reports for container No. H-0027760.

(3) Training of WWIS personnel was reviewed

Actual job performance of a data entry person and a WCO was observed to verify training and qualification. The training records for a data entry person and a WCO were reviewed to ensure that the records were complete. Training included use of the WWIS User's Manual, Training Module 300921B "TRU WIPP Training," and "WWIS Indoctrination Training Course." Training documentation was complete and filed correctly for viewing and reference.

(4) Load management was evaluated

During the inspection Hanford personnel stated that they do not intend to use load management for TRU waste containers they will ship to WIPP. Implementation of load management at Hanford will be a T1 change. (See Table 1 where this is included as a T1 change.)

Summary of WWIS Concerns and Findings

The EPA inspection team did not identify any findings or concerns relative to WWIS during this inspection. There are no open findings or concerns related to WWIS resulting from this inspection.

Proposed Baseline Approval

The system used for container certification that was evaluated during this baseline inspection consisted of the following:

- Trained WWIS Data Entry Personnel and Waste Certification Officer (WCO).
- Approved and controlled operating procedure: WMP-400, Section 7.1.5, Revision 17; WMP-400, Section 1.2.2, Revision 20

Proposed WWIS Tiers

Based on the inspection and the results discussed above, EPA proposes to assign the following tiers.

Tier 1 WWIS Changes that require EPA review and approval prior to implementation:

- Implementation of load management for containers at Hanford

This Tier 1 change will be reported and documentation will be submitted when Hanford is ready for EPA review. Upon review, EPA may request additional information, choose to conduct a desk-top review, and/or confer with Hanford WWIS personnel. Upon evaluation, EPA will issue an approval letter and only after receiving the EPA approval may Hanford load manage containers for shipment to WIPP.

Tier 2 WWIS changes that do not require EPA approval prior to implementation but require reporting and submitting documentation include the following:

- Changes made to WWIS procedure(s) that require CBFO approval.

9.0 RESPONSE TO COMMENTS

This section is reserved for public comments.

10.0 SUMMARY OF RESULTS

10.1 Findings and Concerns

The concerns identified during the inspection, as well as Hanford's responses, are discussed in the preceding sections of this report. Copies of the EPA Inspection Issue Tracking Forms that capture these issues are included in Attachment C.

Hanford responded to all EPA findings and concerns that required a response prior to the inspection closeout on site as well subsequent to the inspection. The EPA inspection team members evaluated all responses for completeness and adequacy, and concluded that each EPA issue requiring a response had been resolved satisfactorily. No EPA issues related to this inspection remain open at this time.

10.2 Conclusions

The EPA inspection team determined that the Hanford WC program activities were technically adequate. EPA is proposing to approve the Hanford WC program in the configuration observed during this inspection and described in this report and the attached checklists (Attachments A.1 through A.9). This proposed approval includes the following:

(1) The AK process for CH retrievably-stored TRU debris and solid wastes and for newly-generated debris wastes

(2) The WRAP SHENCA NDA system for assaying solid and debris wastes

(3) The WRAP GEA Units A and B NDA systems for assaying solid and debris wastes

(4) The WRAP IPAN Units A and B NDA systems for assaying solid and debris waste

(5) The PFF Calorimeters AR-1, AR-5, P-13, P-14 and Q-1 in conjunction with the Room 172 SGSAS for assaying debris wastes

(6) The NDE process of RTR for retrievably-stored solid and debris wastes

(7) VE in lieu of the RTR process for retrievably-stored solid and debris wastes and VET of newly-generated debris wastes

(8) The WWIS process for tracking of waste contents of solid and debris wastes

Note that this proposed approval does **not** include load management.

Hanford must report and receive EPA approval of any T1 changes to the Hanford WC activities from the date of the baseline inspection, and must notify EPA regarding T2 changes according to Table 10, below. It is worth noting that Table 1 in this report closely follows the format used in the previous CH baseline approval report of Los Alamos National Laboratory-Central Characterization Project (LANL-CCP) (see EPA Docket No. A-98-49, II-A4-88). This format departs from what was used in baseline inspection reports and EPA site approval letters prior to LANL-CCP in several ways, as detailed in the LANL-CCP report and repeated here for convenience.

The most important of these differences involves presentation of the T2 elements. In previous reports, there were two T2 columns that have been merged into a single T2 column for Hanford. The T2 column entries have also been modified to better reflect the 40 CFR 194.24 (h) requirements that the site provide notification regarding the completion or availability of specific T2 elements, whereas the previous tables stated that the site must actually provide the T2 elements (document or procedure revisions, etc.). This approach is similar to the tiering tables used in EPA reports for sites characterizing remote-handled TRU waste.

Additionally, there are other minor word changes to the table for the sake of legibility. The ***footnote in Table 1 specifies that substantive changes means changes with the potential to impact the site's waste characterization activities under 40 CFR 194.24 or documentation thereof, excluding changes that are solely related to Environmental Safety &Health (ES&H), nuclear safety, the Resource Conservation and Recovery Act (RCRA) or editorial in nature.

EPA will notify the public of the results of its evaluations of proposed T1 and T2 changes through postings to the EPA Web site and by sending e-mails to the WIPPNEWS list (see Section 2.0 of this report for a brief discussion of tiering). All T1 changes must be submitted for evaluation and approval by EPA prior to their implementation. Upon approval, EPA will post the results of the evaluations through the EPA Web site and the WIPPNEWS list, as described above. Upon completion of its review of the T2 changes submitted at the end of each fiscal quarter, EPA will post the T2 changes. EPA expects the first report of Hanford's T2 changes at the end of the second quarter FY2008.

The scope of the site baseline compliance decision is based on EPA's inspection completed on June 7 and 27, 2007.

Table 10. Tiering of TRU WC Processes Implemented by Hanford Based on June 4–7 and 27, 2007 On Site Baseline Inspection

WC Process Elements	Hanford WC T1 Changes	Hanford WC T2 Changes*
Acceptable Knowledge (AK) and Load Management	Implementation of load management; AK (5) New waste streams created as a result of combining or separating previously distinct waste streams; AK (6) Categories of waste not approved under this baseline inspection (e.g., soil/gravel, newly-generated solids including K Basin waste); AK (16)	Notification to EPA upon completion of AK Accuracy Reports; AK (2) Notification to EPA upon completion of updates to or substantive modifications**** of the following: - AK Summaries/Waste Stream Profile Forms (WSPFs) and AK Documentation Reports; AK (16) - AK-NDA Communication changes; AK (3) - Changes to site procedure WMP 400.7.1.9; AK (4) Notification to EPA upon generation of new WSPFs, AK summaries and AK documentation reports; AK (16)
Nondestructive Assay (NDA)	New equipment or physical modifications to approved equipment**; NDA (1)*** Extension or changes to approved calibration range for approved equipment; NDA (2)***	Notification to EPA upon completion of changes to software for approved equipment, operating range(s) and site procedures that require CBFO approval; NDA (2)***
Real-Time Radiography (RTR)	N/A	Notification to EPA upon the following: - Implementation of new equipment or substantive changes**** to approved equipment; RTR (1) - Completion of changes to site procedures requiring CBFO approval; RTR (2)
Visual Examination (VE) and Visual Examination Technique (VET)	N/A	Notification to EPA upon the following: - Completion of changes to site VE and VET procedures requiring CBFO approval; VE (1) and VET (1) - Addition of new Summary Category Group (SCG) or waste stream(s); VE (2) and VET (2)
WIPP Waste Information System (WWIS)	Implementation of load management; WWIS (4)	Notification to EPA upon the completion of changes to WWIS procedure(s) requiring CBFO approval; WWIS (1)

* Upon receiving EPA approval in this action, Hanford will report all T2 changes to EPA at the end of each fiscal year quarter.

** Modifications to approved equipment include all changes with the potential to affect NDA data relative to waste isolation and exclude minor changes, such as the addition of safety-related equipment.

*** These are discussed in Sections (1) and (2) of the section for each NDA system, i.e., 8.2.1 for WRAP GEA A &B, 8.2.2 for WRAP IPAN A & B, 8.2.3 for WRAP SHENCA and 8.2.4 for PFP Calorimeters and the Room 172 SGSAS.

****_Substantive changes_ means changes with the potential to impact the site's waste characterization activities or documentation thereof, excluding changes that are solely related to Environmental Safety & Health (ES&H), nuclear safety, the Resource Conservation and Recovery Act (RCRA) or are editorial in nature.

11.0 REFERENCES

New Mexico Environment Department, Waste Isolation Pilot Plant Hazardous Waste Facility Permit (WAP), NM48901 139088-TSDF, Santa Fe, New Mexico, 1989.

U.S. Code of Federal Regulations, Title 40, *Protection of Environment,* Part 191, "Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes."

U.S. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 194, "Criteria for the Certification and Re-Certification of the Waste Isolation Pilot Plant's Compliance with the 40 CFR Part 191 Disposal Regulations."

U.S. Department of Energy, "40 CFR Part 191, Compliance Certification Application for the Waste Isolation Pilot Plant," DOE/CAO 1996-2184, Carlsbad, New Mexico, 1996.

U.S. Department of Energy, "40 CFR Part 191, Subparts C and D, Compliance Recertification Application 2004," DOE/WIPP/2004-3231.

U.S. Department of Energy, "Transuranic Waste Baseline Inventory Report," Rev.0, DOE/TRU-2206-3344

U.S. Department of Energy, Carlsbad Area Field Office, "Contact-Handled Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant (CH-WAC)," Rev. 3, DOE/WIPP-02-3122, Carlsbad, New Mexico, April 25, 2005.

U.S. Department of Energy, Carlsbad Area Field Office, "Quality Assurance Program Description (QAPD)", DOE/CBFO-94-1012, Rev. 7, Carlsbad, New Mexico, July 2005.

U.S. Environmental Protection Agency, "Criteria for the Certification and Recertification of the Waste Isolation Pilot Plant's Compliance with the Disposal Regulations: Certification Decision; Final Rule," *Federal Register*, Vol. 63, No. 95, May 18, 1998, pp. 27354, 27405.

U.S. Environmental Protection Agency, "EPA Replicate Testing for WIPP Nondestructive Assay (NDA) Systems," Rev. 2, June 2002.

U.S. Nuclear Regulatory Commission, "Contact-Handled Transuranic Waste Authorized Methods for Payload Control" (CH-TRAMPAC).

ATTACHMENTS A.1 THROUGH A.9

CHECKLISTS

ATTACHMENT A.1: ACCEPTABLE KNOWLEDGE (AK) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8 **Inspection Date: June 04 – 07, 2007**

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
GENERAL			
AK-1: Is the waste TRU by definition as presented in the LWA? (P.L.102-579)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01. Data examined indicates waste is TRU waste by definition.
AK-2: Do the presented volumes comport with LWA capacity restrictions? (P.L.102-579)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01. No data examined identified any issues with respect to waste volume.
AK-3: Are any wastes considered (or previously considered HLW? HLW are prohibited. (P.L.102-579)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01. Tank or other wastes that may be HLW were not included in the streams examined. Hanford must ensure that all waste subsequently included in waste streams does not meet the definition of HLW.
AK-4: Are any wastes considered (or previously considered) Spent Nuclear Fuel? (P.L.102-579)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01. Tank or other wastes that may contain SNF were not included in the streams examined. Hanford must ensure that all waste subsequently included in waste streams does not meet the definition of SNF.
AK-5: Are these defense wastes? (P.L.102-579)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, TRU-SPO-11.4.4-0322200626252. Data examined indicate waste has defense origin.

ATTACHMENT A.1: ACCEPTABLE KNOWLEDGE (AK) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8 **Inspection Date: June 04 – 07, 2007**

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
AK-6: What is the scope of authorization sought (i.e., SCG, newly generated vs. retrievably stored, other site-specific breakdowns)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21. Waste streams include newly debris generated VIPAC "pins", retrievably stored RFETS solidified ash, and retrievably stored D&D building 233SD debris. Therefore, the scope of the approval includes newly generated and retrievably stored S5000 and retrievably stored S3000.
AK-7: Is AK used that was assembled prior to an EPA approved QA program (retrievably stored). If so, what qualification process is used? Is this waste undergoing confirmation as per the CCA/CRA (100% sampling)? [194.24(c)(2)-(5), 194.22(a)]	WM-400-7.1.9, Revs. 20 and 21, P.L. 102-579	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21. BDRs PFP-VE-2006-028, TRU-WRP-11.1.9-0601200654381, WR-TB-2006-176, PFP-VE-2006-027, 11.19-0522200633466. WR-TB-2006-156, WR-TB-2006-171, WR-TB-2006-172, WR-TB-2006-203, WR-TB-2006-204. PFP-VE-2003-033, N/A, TRU-PFP-11.1.6-1209200355201; PFP-TB-2003-182 (billet can), PFP-VE-2003-033, N/A, TRU-PFP-1.1.6-1031200353668; PFP-TB-2003-182 (billet can). VE, VET, RTR, NDA used to collect confirmatory data for each container.
	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1; HNF-30022, Rev. 1, HNF-30266 Rev. 21. BDRs PFP-VE-2006-028, TRU-WRP-11.1.9-0601200654381, WR-TB-2006-176, PFP-VE-2006-027, N/A, 11.19-0522200633466, WR-TB-2006-156, WR-TB-2006-171, WR-TB-2006-172, WR-TB-2006-203, WR-TB-2006-204. PFP-VE-2003-033, N/A,

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
			TRU-PFP-11.1.6-1209200355201, PFP-TB-2003-182 (billet can), PFP-VE-2003-033, N/A, TRU-PFP-1.1.6-1031200353668, PFP-TB-2003-182 (billet can). VE, VET, RTR, NDA used to collect confirmatory data for each container.
PERSONNEL TRAINING REQUIREMENTS			
AK-9: Procedures require staff to be qualified to assemble, compile and confirm AK data, including but not limited to: a. Identification of required reading list and successful completion of all required reading including, but not limited to: • Applicable portions of the WIPP WAP and TSDF WAC • WIPP Compliance Certification Decision Conditions 2 and 3 • State and Federal RCRA regulations associated with solid and hazardous waste characterization • Discrepancy resolution and reporting processes • Site-specific procedures associated with waste characterization using acceptable knowledge	WM-400-7.1.9, Rev 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	Training records for Naeem Abdurrahman, Karl Husted, Molly Anderson, Dalena Rollosson, Scott Bisping, Personnel Classification Detail Printed 6/5/2007, Vallecitos Mixed Debris Waste Stream RLMGEVALD, Bulletin Number TB-T-003, Revision 0, Course No.300920, Acceptable Knowledge Documentation Management Training, TRU-SPO-15.1 Training Bulletin, VIPAC Waste Stream, Compacted Mixed Oxide Fuel Pins Waste Stream (RLVIPAC) Training Bulletin, TB-T-06-001, Revision 1. Training Program 300921B. Training includes required elements, but EPA recommends that the formal WIPP training include a section specific to EPA requirements and regulations, and that OJT requirements pertaining to database use and other elements be better documented in the individual training records.

ATTACHMENT A.1: ACCEPTABLE KNOWLEDGE (AK) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8 **Inspection Date: June 04 – 07, 2007**

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
b. Successful completion of testing to demonstrate understanding of required reading list c. Completion of internal and/or external training programs pertinent to AK d. Participation in internal audits to assess AK program e. Other methodologies for demonstrating AK proficiency as developed on a site-specific basis (WAP B4, B4-3a)			
PROCEDURE SCOPE			
AK-10: a. Are procedures adequate to encompass the spectrum of wastes for which authorization is sought? b. Are there different procedures for newly generated vs. retrievably stored waste? Are there different procedures for solid, debris, or soil waste? Should there be? c. For newly generated waste, have adequate procedures been developed and implemented to characterize waste using acceptable knowledge prior to packaging? (WAP B4, B4-3b)	WM-400-7.1.9, Rev 20 and 21,	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21. BDRs PFP-VE-2006-028, TRU-WRP-11.1.9-0601200654381, WR-TB-2006-176, PFP-VE-2006-027, N/A, 11.19-0522200633466. WR-TB-2006-156 WR-TB-2006-171, WR-TB-2006-172, WR-TB-2006-203, WR-TB-2006-204. PFP-VE-2003-033, N/A, TRU-PFP-11.1.6-1209200355201, PFP-TB-2003-182 (billet can), PFP-VE-2003-033, N/A, TRU-PFP-1.1.6-1031200353668, PFP-TB-2003-182 (billet can), WMP-400 TRU Waste Visual Examination Technique, Section 7.1.10, WRP1-OP-0908, Operation of the Drum Nondestructive Examination System, Rev. I, Change 9. VE, VET, RTR, NDA used to collect confirmatory data for each container. Data and procedures indicate that NDA, VET,

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
			VE and RTR may be used to characterize waste, and all of these are governed by procedure addressed in other checklist sections.
ASSEMBLING AK INFORMATION AND COMPILING AK DOCUMENTATION INTO AN AUDITABLE RECORD			
AK-11: What is the breakdown of the types and quantities of TRU waste generated/stored at the site? (WAP B4, B4-2a)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01, TRU-WST-11.4.4-0306200653337. Data included in the above references covered the breakdown and quantity of TRU waste generated and/or stored at the site.
AK-12: Do procedures call for AK information to be collected for: a. ^{241}Am, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{233}U, ^{234}U, ^{238}U, ^{90}Sr, ^{137}Cs + unexpected radionuclides b. ferrous metals (in containers) c. cellulosics, plastics, rubber d. nonferrous metals (in containers) (CRA/CCA Ch 4 and Attachments/Appendices)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01, TRU-SPO-11.4.1-0522200136372, TRU-SPO-11.9-0429200249268, MT400-PJC-02-077, TRU-WST-11.4.3-0306200649480, TRU-WST-11.4.3-0411200631609, TRU-WST-11.4.3-01122006371, TRU-WST-11.4.4-0404200636694, TRU-SPO-11.4.3-1127200254744, TRU-SPO-11.4.1-0817200045262. Radionuclide data were adequately assembled, noting that modification to the AK write up pertaining to the 233SD waste stream required significant modification to address questions pertaining to isotopic distribution ranges, typographic errors, etc. Also note that AK Summaries/Documentation Reports include detailed discussion of WMP including those in the listing. Breakdown of WMPs appeared

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
			adequate, noting that the Hanford AKE recalculated the WMP% and SCG/WS determinations for waste stream 233SD when it was noted that this stream actually contained a large percentage of solidified material.
AK-13: Do procedures require documentation of radionuclide process origin? Are the facility and TRU waste management operations correlated to specific waste stream information? (Attachment B4; CH WAC Appendix A.2.2)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01, TRU-SPO-11.4.1-0522200136372, TRU-SPO-11.9-0429200249268, MT400-PJC-02-077, TRU-WST-11.4.3-0306200649480, TRU-WST-11.4.3-0411200631609, TRU-WST-11.4.3-01122006371, TRU-WST-11.4.4-0404200636694, TRU-SPO-11.4.3-1127200254744, TRU-SPO-11.4.1-0817200045262, HNF-29578, Rev.1; HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01, TRU-SPO-11.4.1-0522200136372, TRU-SPO-11.9-0429200249268, MT400-PJC-02-077, TRU-WST-11.4.3-0306200649480, TRU-WST-11.4.3-0411200631609, TRU-WST-11.4.3-01122006371, TRU-WST-11.4.4-0404200636694, TRU-SPO-11.4.3-1127200254744, TRU-SPO-11.4.1-0817200045262. Radionuclide process origin was adequately researched. Waste stream correlation to processes was sufficient based on data examined, and the site defined and justified

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
			their individual waste streams.
AK-14: Are correlations between waste streams, with regard to time of generation, waste generating processes, and site-specific facilities clearly described? For newly generated wastes, the rate and quantity of waste to be generated shall be defined. (Attachment B4, B4-3c; CH WAC Appendix A, Section A.2)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01. Waste generation processes, waste generation timing, and rates/quantities are well defined in documents examined.
AK-15: a. Are wastes streams appropriately identified and are wastes characterized on a waste stream basis? b. Are wastes grouped on a waste stream basis using Acceptable Knowledge and are they characterized *in the same manner* (i.e., by visual examination) as a newly generated waste if a waste does not have all mandatory AK documentation requirements? (Attachment B4, Section B-1a)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01. Waste streams examined are adequately defined and well justified. None of the wastes streams were missing mandatory information, the absence of which would mandate implementation of VE for subject waste stream.

ATTACHMENT A.1: ACCEPTABLE KNOWLEDGE (AK) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8 **Inspection Date: June 04 – 07, 2007**

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
AK-16: Do procedures demonstrate a logical progression from general facility information to more detailed waste stream-specific information?	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01. TRU-WST-11.4.3-0410200659629, TRU-WST-11.4.3-0623200546423, TRU-WST-11.4.3-0306200649480, TRU-WST-11.4.4-0404200636694, TRU-SPO-11.4.1-0531200656272, TRU-SPO-11.9-0320200357843, TRU-SPO-11.9-0314200334327. Site has assembled adequate detail allowing appropriate examination of the AK record for logical progression of data.
AK-17: Does the process include review of AK information to evaluate and document AK-AK information discrepancies? (CH WAC Section A.2.2.3, Attachment B4, Section B4-3)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, TRU-SPO-11.9-03282200539609, TRU-SPO-11.4.5-0914200635089. Waste Stream, RLM233SD included several containers identified through RTR as containing >50% sludge. The event was well documented.

ATTACHMENT A.1: ACCEPTABLE KNOWLEDGE (AK) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8 **Inspection Date: June 04 – 07, 2007**

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
AK-18: Do procedures require collection of information regarding how waste is tracked and managed at the generator site (including historical and current operations)? (Ch WAC Section A.2; Attachment B4 Section B4-2a)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	Hanford uses several databases to obtain and document AK including but not limited to: Transuranic Waste Baseline Inventory Report (TWBIR, 2004) is one initial source of information regarding waste stream designation and assignment. Solid Waste Information Transfer System (SWITS) appears to be a primary source of information; this system includes, for example, original generator records and was used to obtain information about the drums, including radionuclide content (as available). WRAP's Data Management System served as an information sources. Records Management Information System (RMIS), which is being replaced by the IDMS (Integrated Document Management System). Procedure WMP 400 7.1.9 requires that a spreadsheet be developed to track waste characterization status and includes the following: • Container I.D. • Waste Stream I.D. • Repacked From Container I.D. • Overpacked Into • NCRs/CARs • Generation Date/Closure Date Waste characterization data is managed using the Hanford Electronic Data Management Tool.

ATTACHMENT A.1: ACCEPTABLE KNOWLEDGE (AK) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8 **Inspection Date: June 04 – 07, 2007**

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
AK-19: Is AK information compiled in an auditable record, including a road map for all applicable information?	WM-400-7.1.9, Rev 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, Attachment 2 of each of these. Reference lists that adequately present the AK information available for each stream have been prepared. However, Hanford's document numbering system is cumbersome, and the numbers do not correspond for the same documents in the AK Summary attached to the WSPF and AK Documentation report (which is a detailed AK report for each waste stream)
AK-20: Has a reference list been provided that identifies documents, databases, Quality Assurance protocols, and other sources of information that support AK information? (Attachment B4, Section B4-3c)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01. AK Summary attached to the WSPF and the AK Documentation Report each contains detailed reference lists.
AK-21: Have the following mandatory information requirements been identified? • Map of the site that identifies the areas and facilities involved in TRU waste generation, treatment, and storage • Facility mission description related to TRU waste generation and management • Description of the operations that generate TRU waste at the site and process information, including:	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01, TRU-WST-11.4.3-1018200524319, TRU-WST-11.4.3-0623200546423, TRU-WST-11.4.3-0306200649480, TRU-SPO-11.4.3-1127200254744, TRU-SPO-11.4.4-0915200652210. Hanford chooses to prepare both a detailed AK Documentation Report and a less detailed AK Summary and he later is attached to the WSPF. Documents examined included all of the required mandatory information. Note that in the case of Building 233SD, additional isotopic information is required to ensure that a

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
- Area(s) or building(s) from which the waste stream was or is generated - Estimated waste stream volume and time period of generation - Waste generating process description for each building or area - Process flow diagrams, if appropriate - Generalized material inputs or other information that identifies the radionuclide content of the waste stream and the physical waste form - Types and quantities of TRU waste generated, including HNF 29578, Rev.1; HNF-30022, Rev. 1, HNF- 30266 rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01, historical generation through future projections • Physical/chemical waste composition that could affect isotopic distribution (i.e., processes to remove ingrown ^{241}Am) • Statement of all numerical adjustments applied to derive the material's isotopic distribution, e.g., scaling factors, decay/ingrowth corrections and secular equilibrium			complete discussion is included; additionally, VIPAC discussions required inclusion of typical MOX Uranium ratio data. Both of the AK Documentation reports associated with these streams were revised during the inspection to address these concerns.

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
considerations • Specification of isotopic ratios for the 10 WIPP-tracked radionuclides and, if applicable, the radionuclides that comprise 95% of the hazard (CH WAC Section A.2.2; Attachment B4, B4-2a, B4-2b)			
AK-22: Does the site have procedures for the collection of supplemental information? Examples of supplemental information, from CH WAC, include: • Safeguards and security and other material control systems/programs • Reports of nuclear safety or criticality • Accidents involving SNM waste packaging and waste disposal • Building or nuclear material management area logs or inventory records • Site databases that provide SNM or nuclear material information test plans • Research project reports, or laboratory notebooks that describe the radionuclide content of materials used in experiments • Information from site personnel	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	TRU-SPO-11.4.1-0522200136372, TRU-SPO-11.9-0429200249268, MT400-PJC-02-077, TRU-WST-11.4.4-0306200653337, TRU-WST-11.4.3-1018200524319, TRU-WST-11.4.3-0306200649480, TRU-WST-11.4.3-0411200631609, TRU-WST-11.4.3-0623200539427, TRU-WST-11.4.4-0404200636694, TRU-SPO-11.4.1-0531200655795, TRU-SPO-11.4.3-0314200657948, TRU-SPO-11.4.1-0531200655971, TRU-SPO-11.4.4-0322200626252, TRU-SPO-11.9-0731200645848, TRU-SPO-11.9-0320200357843, TRU-SPO-11.9-0314200334327, TRU-SPO-11.4.1-0408200229341, RHZ-221-31639, TRU-SPO-11.4.1-1125200331472. The site has assembled hundreds of supplementary documents to augment mandatory data. Data examined were related to the referenced to applicable sections of the report, and the use of supplemental data was adequate.

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
• Historical analytical data relevant to isotopic distribution in the waste stream (CH-WAC Section A.2.2.2; Attachment B4 Section B4-2c)			
AK-23: Is all necessary supplemental information assembled and has it been appropriately used? (Section B4-2c)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	See listing presented in Item AK-22. Also, each AK Summary included a listing of assembled data as Attachment 2 to that document; comparison of the listing with references in the text showed that adequate supplemental data had been assembled for the select elements examined.
AK-24 a. Are waste categorization schemes presented and are they appropriate? b. Are waste identification/categorization schemes relevant to the isotopic composition of waste? (Attachment B4 Section B1, CH-WAC page ix, Appendix A.2)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01. TRU-SPO-11.4.1-0522200136372, TRU-SPO-11.9-0429200249268, MT400-PJC-02-077. Waste categorization schemes are appropriate and include identification of general radiological composition (e.g., VIPAC are MOX, RFETS ash is composed of WG Pu).
AK-25 • Have data uses and limitations been assembled and are they technically adequate? (CRA/CCA; CH-WAC Appendix A, Section A.2.2.3)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	WM-400-7.1.9 includes an Attachment 4 that is completed and placed atop each reference; the attachment includes a location where AK source document limitations are documented.

ATTACHMENT A.1: ACCEPTABLE KNOWLEDGE (AK) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8 **Inspection Date: June 04 – 07, 2007**

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
GENERATING AN AK SUMMARY/AK DOCUMENT			
AK-26: Site documents/procedures require the facility prepare an AK summary document that summarizes all information collected, including the basis for all waste stream designations. Is the AK Summary of sufficient scope and detail? (CH-WAC Appendix A Section A.2.2; Attachment B4 Section B4-2b)	WM-400-7.1.9, Revs. 20 and 21	Partially Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01. EPA examined each document and found that the AK Summaries should address several revisions. For VIPAC, the following revisions to the AK Documentation Report were requested: • Clarify that the anthropogenic nature of the entire pin/assembly qualifies the pin as a debris item. • Revise Table 1 to clarify that ceramics, firebrick and other debris material are not expected to be present • Clarify that PNL was not an independent source of pins to the waste stream • Add the isotopic distribution for natural uranium to the radionuclide Section 3.6 • Correct references and typographical issues as identified. For 233SD D&D debris streams, the following revisions to the AK Documentation Report were requested: • Revise Table 5 to reference the sources for ranges presented • Revise the text in Section 3.7 to explain the source of information presented on Table 5, including an explanation of how the data were generated or derived, information sources, data limitations, and other relevant

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
			changes to better explain the process used to generate the isotopic distribution. • Revise the text of Section 3.7 to explain why ^{237}Np is not expected even though a ^{237}Np line to the 233-S facility was installed. • Explain what is meant by a "significant recycle" with respect to uranium in the waste stream • Assess whether revisions of Table 1 are required because a number of containers have been identified, through RTR, as containing sludges and therefore do not match the SWDR or burial records from which Table 1 values were derived. • In light of the AK Accuracy of 55% with respect to summary category group identification, prepare an AK Reconciliation [re-evaluation] Report to address these concerns. • Correct references and typographical issues as identified.
AK-27: Are conclusions and interpretations presented in the AK Summary technically sound and supported by referenced mandatory and supplemental information?	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01. Review of conclusions and interpretations in the AK Summaries and AK Documentation reports indicated that both are supported by reviewed mandatory and supplemental data. Note that the WSPFs included the AK Summaries, so the AK Summaries are included

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
			when the WSPFs are discussed.
AK-28: If AK data discrepancy is identified, site will evaluate the source of the discrepancy to determine if discrepant information is credible. Information that is not credible will be identified as such and reasons for dismissing will be justified in writing. Limitations concerning information will be documented in the AK record and summarized in the AK report. If a discrepancy cannot be resolved, the site will perform direct measurements for the impacted population. (CH WAC Appendix A.2, Section A.2.2.3)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01, TRU-SPO-11.9-03282200539609. The RLM233SD waste stream consists of D&D wastes that were created in two different time periods (1979-1981 and 1990-1994); the D&D activity was for the same building/area. When asked why the process took place in two phases, the AKE indicated that programmatic budgetary constraints ceased initial D&D activities, so there is no physical or material differentiation of the waste stream based on time periods. RLM233SD did, however, include several containers identified through RTR as containing >50% sludge, requiring the drums to be reassigned to an S3000 stream (AK Summary and other documentation for this stream has yet to be assembled). The NCR process documented this discrepancy, and the process "worked" to remove containers from the stream.
AK-29 : Is load management being proposed? Does the AK Summary include the following from the CH WAC, Rev 3 Appendix E? • Each TRU waste stream selected for payload management must include in its acceptable knowledge summary report an estimate of the total waste volume and the	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	During interviews, the AKE indicated that Load Management will never be used because the facility has access to an onsite low level waste facility (ERDF).

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
percentage of the waste volume that is above and below 100 nCi/g. (It should be noted that this information, although based on the best available AK information, is preliminary and subject to the performance of WIPP-certified NDA measurements and cannot and will not be used as a measure of AK accuracy.) (Reference E3) (CH-WAC, Appendix E)			
IDENTIFYING MANAGEMENT CONTROLS FOR DISCREPANT ITEMS/CONTAINERS/WASTE STREAMS AND DATA MANAGEMENT/ TRACKING			
AK-30: Are nonconforming wastes segregated? Are NCRs disposition in an appropriate and technically defensible manner? (Attachment B4, Section B4-3b, Attachment B3, Section B3-13)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 rev. 21. WR-TB-2006-470, NCR Report, WMP TRU Waste Characterization, Waste Stream RFETS01, Nonconforming items are segregated and, as necessary, either remediated or placed in a different waste stream. See AK-28 above.
AK-31: Do site procedures require that additional information be collected before waste may be shipped if the required AK information is not available for a waste stream or if available AK is poor or unacceptable? (Attachment B4, Section B1)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 rev. 21. WR-TB-2006-470, NCR Report, WMP TRU Waste Characterization, Waste Stream RFETS01. See AK Items 30, 28 and 10.
CONFIRMING AK INFORMATION WITH OTHER ANALYTICAL RESULTS			
AK-32: Do these procedures facilitate the mandatory traceability analysis performed for each Summary Waste	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	BDRs for containers VIPAC:0023117, VIPAC:0023182, 233SD:002873, 233SD:0011764, RFETS:RHZ-221-31628,

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
Category Group examined during the audit, noting that EPA will determine whether the available waste streams adequately demonstrate the full characterization process for the proposed scope? (Attachment B4, Section B4-2)			RFETS:RHZ-221-31639; D79-10A43 and UC-808-7, Container Data Reports/print outs, Containers 0011813-0012639, TRU-SPO-11.9-0731200645848. For each container, historic records such as a Facility Material Records (VIPAC) Solid Waste Disposal Records or ERC Waste Inventory Sheets, were identified that provided general radiological and/or physical data. The VIPAC stream traceability was tested assuming that each pin has a unique, traceable radiological signature that can be tracked back to the original assembly data. This proved to be incorrect because the tested assemblies (AD84, AB98, and AA in drum 23117, and assemblies AE03, AF97 and AC47 for assemblies 23182) were traceable by generalized assembly "groupings". However, the test proved that available data could be traced to the lowest, most detailed level of information available.
AK-33: If AK was used (i.e., data collected prior to QA program), what method was employed to qualify the information? Approved methods or peer review, corroborating data, confirmatory testing, and QA program equivalency? If confirmatory testing is used, has the following been considered (from CH WAC) • At a minimum, to confirm existing AK data, it is necessary to compare ratios of the two most prevalent radionuclides in the isotopic mix	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01. TRU-SPO-11.9-0429200249268, MT400-PJC-02-077, WMP-350 Section 2.2, Part 3.3. Representatives interviewed and data examined indicated that NDA personnel used measurement data when possible to except for those that must are scaled or based on isotopic relationships: ^{90}Sr and ^{137}Cs; $^{234}U/^{235}U$; and ^{234}U ^{238}U. If measurement data were not deemed reliable or usable, NDA personnel access individual container radiological data

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
a. For ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Pu, ^{242}Pu and ^{241}Am: • Confirmation can be accomplished via comparison of measured and AK values for ^{239}Pu/ ^{240}Pu for weapons grade plutonium; ^{238}Pu/ ^{239}Pu for heat source • Measured ^{241}Am can be used to calculate ^{241}Pu (for subsequent AK comparison) if time of chemical separation is known (no ^{241}Am at time of separation assumed) • ^{241}Pu can be compared (by ratio) to confirm AK of any Pu isotope associated with WG/RG (i.e., ^{239}Pu or ^{240} Pu) • ^{238}Pu from AK for WG/RG Pu is assumed to be valid if the AK values of ^{239}Pu and ^{240}Pu have been confirmed by measurement • ^{242}Pu calculated by correlation techniques, since it can't be measured b. For ^{235}U, ^{233}U, ^{238}U, ^{234}U: • Were they tracked or measured in AK information? • If no valid AK exists, data generated can only be used to			available on SWITS, as the NDA personnel are trained AK data assemblers. In these cases, AK data would be used. When there is no AK data and measurements cannot be taken, Hanford "default" values presented in Table 1 of WMP 350 Section 2.2 are used. The methods cited within the WAC for isotopic comparisons are not used by the site other than as discussed above.

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
detect or calculate, or confirm absence ratios for ^{234}U calculated from ^{235}U enrichment • If valid AK exists can confirm with certified systems • ^{234}U calculated by ^{235}U enrichment, because ^{234}U can't be measured c. For ^{137}Cs and ^{90}Sr: • Confirmed by WIPP-certified system (direct measurement or comparison of ^{241}Am peak at 662 keV to other ^{241}Am peaks (disproportionate ^{241}Am peak at 662 keV could mean presence of ^{137}Cs) • ^{90}Sr calculated from ^{137}Cs using scaling factors Other radionuclides – must identify via NDA and should identify via AK (40 CFR 149.22(b), CH WAC, Appendix A, Section A.2.1)			
AK-34: If waste is generated after an EPA approved QA program, are radioassay and NDE results compared to the data assembly process as a cross reference to verify implementation of the as-generated characterization program? (194.24 (c)(3); 194.22(b))	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01. Note that the VIPAC pins are considered newly generated because they have only recently been deemed waste (post EPA approval of the QA program). AK re-evaluation/reconciliation is performed to assess and document these comparisons (Attachment 10 of

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
			WM-400-7.1.9).
AK-35: This procedure requires a reevaluation of AK if NDE identifies it to be a different waste matrix code. This procedure describes how the waste must be reassigned, based on the AK reevaluation. (Attachment B4, Section B4-3d)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01. See item AK-28, above as an example of NDE identification of incorrect SWCG and subsequent actions taken.
AK-36: Does the generator site have written procedures for newly generated waste to document the confirmation of acceptable knowledge information with visual examination prior to or during waste packaging? Do these procedures address the required elements in 3.4-3d? (Attachment B4, Section B4-3d)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	See Item AK-35 above. Note that newly generated waste does and will undergo visual examination technique; see VET checklist for additional information.
AK-37: Procedures require the following steps to be followed if wastes are reassigned to a different waste matrix code based on NDE: • Review existing information based on the container identification number and document all differences • Reassess and document all analytical data associated with the waste • Reevaluate waste material parameter determinations and document any	WM-400-7.1.9, Revs, 20 and 21	Partially verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	TRU SPO-11.4.4 0418200729491, WR-TB-2006-470, Attachment 10 of WM-400 7.1.9, Rev.20 and 21. Example nonconformance was provided (WR-TB-2006-470); site was requested to prepare an AK Re-Evaluation for to address the discrepant containers discovered in the 233SD waste stream [the containers were discovered based on NDE (no QuickScan had been performed on these containers)]. See item AK-35, above and AK-38, below.

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
changes • Reevaluate the radionuclide content and document any changes • Verify and document that the reassigned waste matrix code was generated within the specified time period, area and buildings, waste generating process, and that the process material inputs are consistent with the waste material parameters identified during radiography or visual examination • Record all changes to acceptable knowledge records • If discrepancies exist in the acceptable knowledge information for the reassigned waste matrix code, complete a nonconformance report, document the segregation of this container, and define the corrective actions necessary to fully characterize the waste (Attachment B4, Section B4-3d)			
AK-38: Has the acceptable knowledge expert calculated the percent changes in matrix parameter categories (MPCs) based on AK and NDE/VE? Were accuracy evaluations assigned? Are these acceptable? (Attachment B4, Section B4-3e; CH-WAC Appendix A, Section A.6.5)	WM-400-7.1.9, Revs. 20 and 21	Verified through Review of Objective Evidence and Interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01, TRU-SPO-11.9-05302007734551, Acceptable Knowledge Performance Report, SPO 11.9, 0530200734551. The May 16, 2007 Acceptable Knowledge Performance Report for 1575 containers was provided, including

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
			containers from the RLVIPAC.001 and RLM233SD.001 waste streams. The AK Accuracy report calculated the percent of waste streams requiring reassignment to a new waste stream based on waste matrix code changes, as well as the percent of containers that were inconsistent with the anticipated radionuclide composition as indicated in the AK. The report included the RLM233SD waste stream, which had a 55% accuracy because 45% of the containers, identified as debris through AK, were actually solids and had to be reassigned to a separate waste stream. Note that the physical description of the stream was based on AK data, and that recalculation of the physical characteristics of waste stream RLM233SD.001 was performed by the AKE during the inspection, and the AKE found that the physical description of the waste in the AK Summary/Documentation report was still accurate. It is recommended that the site prepare an AK Re-Evaluation for this inaccuracy.
NDA-AK DATA SHARING AND COMMUNICATION/PROCEDURALIZATION			
AK-39: Are the following bullets addressed with respect to AK-NDA communication and use of AK data by NDA personnel? • Do procedures require the identification of AK data limitations? • Are AK data and associated	WM-400-7.1.9, Revs. 20 and 21	Partially verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	WMP Training Bulletin, Hanford GE-Vallecitos Mixed Debris Waste Stream RLMGEVALD, Bulletin Number TB-T-003, TRU-SPO-15.1 Training Bulletin, VIPAC Waste Stream. Hanford requires that all NDA personnel be trained AK Data Collectors, so all NDA personnel understand how to assemble AK and provide any AK data they might find to the AK record. NDA personnel are required to

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
limitations communicated to NDA personnel and is this required by procedure? • How is AK used by NDA? • Do AK and NDA personnel communicate and agree about the use of AK? • Is this agreement proceduralized? (CH-WAC, Appendix A)			read the AK Training Bulletin for each waste stream that presents a summary of AK-derived radiological information. AK-NDA communications occur through regular meetings, emails, and phone calls. The Vallecitos waste stream Record of Email Communications and Training Bulletin was provided as evidence of AK-NDA communication. The process used by Hanford effectively implements AK-NDA communication but is not proceduralized. Hanford agreed to revise WM-400 7.1.9 to proceduralize the process.
AK-40: Have internal audits been performed? (Attachment B4, Section B4-3e)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	TRU-SPO-14.21016200635776. Internal assessments of the AK program have been performed.
AK-41: Has a waste stream been revoked based either on AK information or reassessment as part of reconfirmation? If so, was the procedure(s) followed? (Attachment B4, Section B4-4)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01. No example available to date, noting that the portion of the 233SD waste stream identified as S3000 cannot be shipped until a WSPF and related documentation are prepared and approved.
AK-42: If data consistently indicate discrepancies with acceptable knowledge information, the site increases sampling, reassesses the materials and processes that generate the waste, and resubmits waste stream profile information. (CH-WAC Section A.2.2.3; Attachment B4,	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01. No example available to date.

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
Sections B4-3b, B4-3d)			
QA OBJECTIVES FOR AK AND OTHER ELEMENTS			
AK-43: Are acceptable knowledge processes consistently applied among all generator sites, and does each generator site comply with the following data quality requirements for acceptable knowledge documentation: a. Precision - Precision is not applicable to AK (see Attachment B4) b. Accuracy - Accuracy is the degree of agreement between an observed sample result and the true value. The percentage of waste containers which require reassignment to a new waste matrix code based on the reevaluation of acceptable knowledge and sampling and analysis data will be reported as a measure of acceptable knowledge accuracy. Accuracy based on radionuclide content is typically assessed by comparing measured results with AK data. c. Completeness - Completeness is an assessment of the number of waste streams or number of samples collected to the number of samples determined to be useable through the data validation process. The acceptable knowledge record must	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01, TRU-SPO-11.9-05302007734551, Acceptable Knowledge Performance Report, SPO 11.9, 0530200734551. The May 16, 2007 Acceptable Knowledge Performance Report for 1575 containers was provided, including containers from the RLVIPAC.001 and RLM233SD.001 waste streams. See item 38 for data limitations and AK Accuracy. .

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
contain 100 percent of the information specified in Section B4-2. The usability of the acceptable knowledge information will be assessed for completeness during audits.			
d. Comparability - Data are considered comparable when one set of data can be compared to another set of data. Comparability is ensured through sites meeting the training requirements and complying with the minimum standards outlined for procedures that are used to implement the acceptable knowledge process. CH-WAC Section A.6.5: Additionally, comparison of measured data with AK-derived or -based values, as applicable, provides a means to assess comparability on a waste stream basis.			
e. Representativeness - Representativeness expresses the degree to which sample data accurately and precisely represent characteristics of a population. Representativeness is a qualitative parameter that will be satisfied by ensuring that the process of obtaining, evaluating, and documenting acceptable knowledge information is performed in accordance with the minimum			

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
standards established in Section B3. Sites also must assess and document the limitations of the acceptable knowledge information used to assign waste parameters. (Attachment B4, Section B4-3e)			
AK-44: Does the generator site address quality control by tracking its performance with regard to the use of acceptable knowledge by: 1) assessing the frequency of inconsistencies among information, and 2) documenting the results of acceptable knowledge confirmation through radiography or visual examination? In addition, the acceptable knowledge process and waste stream documentation must be evaluated through internal assessments by quality assurance organizations and assessments by auditors or observers external to the organization (i.e., CBFO, NMED, EPA). (Section B4-3e)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01, TRU-SPO-11.9-05302007734551, Acceptable Knowledge Performance Report, SPO 11.9, 0530200734551. The May 16, 2007 Acceptable Knowledge Performance Report for 1575 containers was provided, including containers from the RLVIPAC.001 and RLM233SD.001 waste streams. See Items 38 and 40, above.

ATTACHMENT A.1: ACCEPTABLE KNOWLEDGE (AK) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8 **Inspection Date: June 04 – 07, 2007**

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
AK-45: Did the generator site implement, or does it currently implement, process controls to ensure that prohibited items are documented and managed in accordance with site-specific certification plans and that the following minimum site specific controls: • Identify the organization(s) responsible for compliance with administrative controls • Identify the oversight procedures and frequency of actions to verify compliance with administrative controls • Develop on-the-job training specific to administrative control procedures • Ensure that personnel may stop work if noncompliance with administrative controls is identified • Develop a nonconformance process that complies with the requirements in Section B3-13 of the WAP to	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	HNF 29578, Rev.1, HNF-30022, Rev. 1, HNF-30266 Rev. 21, WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01, WRP1-OP-0908. The generator site, Hanford,, implements procedures to control the inclusion of prohibited items in waste via use of QuickScan as a way to quickly assess waste content and may consider this a type of administrative control. Also, Hanford implements procedures to generate NCRs, some of which are created with respect to AK. The management of prohibited items detected via AK, RTR, or VE was not examined except to understand that drums containing prohibited items are segregated from the waste stream population for later disposition (e.g., treatment). Therefore, while discussed in the WAP Appendix B4 (AK), administrative controls are programmatic and better addressed outside of AK except where process controls currently or historically address waste content as it is generated.

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
document and establish corrective actions • Address controlled changes to WAP-related plans or procedures as part of the nonconformance and corrective action process • As part of the corrective action process, assess the potential time frame of the noncompliance, the potentially affected waste population(s), and the reassessment and recertification of those wastes (Attachment B4, Section B4-3b)			
AK-46: Does the generator site document, justify, and consistently delineate waste streams… based on site-specific permit requirements or state-enforced agreements? How do these agreements impact waste characterization? (Section B4-4)	WM-400-7.1.9, Revs. 20 and 21	Verified through review of objective evidence and interview of Molly Anderson, Scott Bisping, Dan Arrenholz, Dalena Rollosson	WSPF for Streams RLM 233SD.001, RLVIPAC.001, RLRFETS.01. It is noted that the site may assign state codes unrelated to radiological constituents that may or may not comport with the WIPP WSPF designations, but this is outside of the scope of EPA's inspection.

ATTACHMENT A.2 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Gamma Energy Analysis Systems A & B (GEA-A & GEA-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
SYSTEM DESCRIPTION					
Identify the NDA system by name, location and number, as appropriate.	NA	General system information	The WRAP Units A and B are located in the WRAP facility.	NA	Physical observation of the GEA Units
Describe the system's operational history including deployment at other DOE sites.	NA	General system information	The SHENCA has been operational continuously in the same location since the last EPA inspection.	NA	Previous EPA inspections that included the GEA Units A and B
For systems that have been deployed at multiple DOE sites document pertinent aspects of each system's development, e.g., installation of new or different detectors, software or other relevant features.	NA	General system information	The WRAP units have not been deployed at other DOE Sites.	NA	Not Applicable
SYSTEM PERFORMANCE					
Identify the period of performance relevant to this inspection and if this NDA system has prior EPA approval(s).	NA	General scoping information	The GEA Units have been operational continuously since the last EPA inspection.	Y	Discussion with N. Abdurrahman during inspection and evaluation of GEA BDRs cited in the next checklist entry
Identify the number of waste containers this system assayed during the period of performance. Of these, indicate how many Batch Data Reports (BDRs) were assembled. Of the assembled BDRs, indicate how many have been promoted through Project Level Review and are available for evaluation during this inspection.	NA	General scoping information	Approximately 1700 containers have been assayed on both GEA Units and these results have been compiled in approximately 123 Batch Data Reports (BDRs) that have been promoted through Site Project Manager (SPM) validation	Y	GEA BDRs WR-TB-2007-082; WR-TB-2007-091; WR-TB-2007-092; WR-TB-2006-228; WR-TB-2006-294, WR-TB-2007-091; WR-TB-2006-198

ATTACHMENT A.2 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Gamma Energy Analysis Systems A & B (GEA-A & GEA-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
GENERAL REPORTING REQUIREMENTS					
Assay systems must report quantitative values and uncertainties for ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{241}Am, ^{233}U, ^{234}U, ^{238}U, ^{90}Sr, and ^{137}Cs.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Quantitative values and uncertainties for ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{241}Am, ^{233}U, ^{234}U, ^{238}U, ^{90}Sr, and ^{137}Cs are reported.	Y	HNF-5148, *Calibration Report for the WRAP Facility GEA System*, Revision 3 (GEA-A); HNF-5149, *Calibration Report for the WRAP Facility GEA System Unit B*, Revision 1A (GEA-B); WMP-350, Section 2.2, Revision 26
Each container characterized and intended for disposal at WIPP must contain TRU waste.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Containers assayed on the GEA Units A and B meet the definition of TRU waste, i.e., contain greater than 100 nCi/g of TRU alpha activity	Y	HNF-5148, *Calibration Report for the WRAP Facility GEA System*, Revision 3 (GEA-A); HNF-5149, *Calibration Report for the WRAP Facility GEA System Unit B*, Revision 1A (GEA-B)
NDA instruments and procedures are appropriate for the waste streams being assayed.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	NDA instruments and procedures are appropriate for the heterogeneous debris wastes currently being assayed.	Y	WMP-350, Section 2.2 Revision 26; WMP-350, Section 2.3, Revision 23; WMP-350, Section 2.8, Revision 5; WMP-350, Section 2.9, Revision 2; WMP-350, Section 2.10, Revision. 1; WRP1-OP-0907, Revision A, Change 9
NDA instruments and procedures result in unbiased values for the cumulative activity of the WIPP radionuclide inventory.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The radioassay values observed in the GEA BDRs were acceptable	Y	HNF-5148, *Calibration Report for the WRAP Facility GEA System*, Revision 3 (GEA-A); HNF-5149, *Calibration Report for the WRAP Facility GEA System Unit B*, Revision 1A (GEA-B); WMP-350, Section 2.2, Revision 26
Some radionuclides are derived by the application of scaling factors or correlation techniques. Identify all	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*,	Values for ^{90}Sr ^{242}Pu, ^{234}U and ^{90}Sr are derived using scaling factors.	Y	WMP-350, Section 2.2, Revision 27

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Gamma Energy Analysis Systems A & B (GEA-A & GEA-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
radionuclides that are quantified in this manner.		Appendix E			
Assess the technical adequacy of the calculations involving the application of scaling factors and/or correlation techniques.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The application of radionuclide scaling factors for ^{242}Pu, ^{234}U and ^{90}Sr is technically adequate.	Y	WMP-350, Section 2.2, Revision 27; GEA BDRs WR-TB-2007-082; WR-TB-2007-091; WR-TB-2007-092; WR-TB-2006-228; WR-TB-2006-294, WR-TB-2007-091; WR-TB-2006-198
Identify the procedures that govern this function and where the results of these calculations are documented.		HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	This function is addressed in WMP-350, Section 2.2, and the results are documented in the GEA BDRs.	Y	WMP-350, Section 2.2, Revision 27
ACCEPTABLE KNOWLEDGE (AK)					
If isotopic ratios based on AK are used the values are qualified by confirmatory testing.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	All waste containers undergo radioassay. AK-based (default) isotopics are used when appropriate, as described in WMP-350, Section 2.2. This approach is technically acceptable.	Y	HNF-5148, *Calibration Report for the WRAP Facility GEA System*, Revision 3 (GEA-A); HNF-5149, *Calibration Report for the WRAP Facility GEA System Unit B*, Revision 1A (GEA-B); WMP-350, Section 2.2, Revision 27
Do NDA personnel use AK derived isotopic values to calculate radionuclide values? If so, is this function performed according to a formal procedure? Assess the technical adequacy of this process(s).	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	AK-based (default) isotopics are used when appropriate, as described in WMP-350, Section 2.2. This approach is technically acceptable.	Y	HNF-5148, *Calibration Report for the WRAP Facility GEA System*, Revision 3 (GEA-A); HNF-5149, *Calibration Report for the WRAP Facility GEA System Unit B*, Revision 1A (GEA-B)
Identify the procedure and where the results of these calculations are	Y	HNF-2600, Revision 19, *Hanford Site Transuranic*	See preceding checklist entry. The results are documented in the GEA BDRs.	Y	HNF-5148, *Calibration Report for the WRAP Facility GEA System*,

ATTACHMENT A.2 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Gamma Energy Analysis Systems A & B (GEA-A & GEA-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
documented.		*Waste Certification Plan*, Appendix E			Revision 3 (GEA-A); HNF-5149, *Calibration Report for the WRAP Facility GEA System Unit B*, Revision 1A (GEA-B)
ISOTOPIC DETERMINATION					
Identify the radionuclides that are measured directly and the specific radiation type (γ, AN or PN) that is measured.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The directly measured radionuclides include ^{241}Am, ^{239}Pu, ^{137}Cs, ^{233}U and ^{235}U. Values for ^{238}Pu, ^{240}Pu and ^{242}Pu are derived using Multi Group Analysis (MGA).	Y	WMP-350, Section 2.2, Revision 27
Identify the method(s) used to derive the isotopic contribution for the unmeasured radionuclides, e.g., MGA, PC FRAM or other technique.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	MGA is the primary analytical approach for isotopic determination. AK-based (default) isotopics are used when appropriate.	Y	WMP-350, Section 2.2, Revision 27

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
LOWER LEVEL OF DETECTION (LLD)					
The LLD for each NDA system must be determined. For multi modal systems this may require a separate determination for each mode, i.e., active neutron, passive neutron and gamma.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The LLDs for both GEA Units system have been determined and are documented.	Y	HNF-11129, Revision 0, *Lower Limit of Detection (LLD) for the WRAP GEA Systems* (GEA-A & GEA-B)
Site-specific environmental backgrounds and container-specific interferences must be accounted for in LLD determinations.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Site-specific environmental backgrounds and container specific interferences are accounted for in LLD determinations for both GEA Units.	Y	HNF-11129, Revision 0, *Lower Limit of Detection (LLD) for the WRAP GEA Systems* (applies to GEA-A & GEA-B)
NDA instruments performing	Y	HNF-2600, Revision 19,	The GEA-A and B Units have the required sensitivity to	Y	HNF-11129, Revision 0, *Lower Limit*

ATTACHMENT A.2 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Gamma Energy Analysis Systems A & B (GEA-A & GEA-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
TRU/Non-TRU waste discrimination measurements are required to have a LLD no greater than 100 nCi/g.		*Hanford Site Transuranic Waste Certification Plan*, Appendix E	discriminate at 100 nCi/g. Only assay values above the LLD will be reported.		*of Detection (LLD) for the WRAP GEA Systems* (GEA-A & GEA-B)
The technical basis and derivation for LLDs must be adequate and appropriately documented.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The technical bases for the LLDs for both GEA Units are technically adequate and are appropriately documented.	Y	HNF-11129, Revision 0, *Lower Limit of Detection (LLD) for the WRAP GEA Systems* (GEA-A & GEA-B)
For radionuclides that are not determined primarily by measurement an LLD analog, i.e., a reporting threshold must be used when it is technically feasible. Identify all instances when this occurs and the form of the documentation of these activities.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	LLD values for ^{234}U and ^{90}Sr are derived by application of radionuclide-specific scaling factors to the LLDs for measured values of primary radionuclides, i.e., ^{235}U and ^{238}U for ^{234}U, and ^{137}Cs for ^{90}Sr. LLDs for ^{242}Pu are based on measured Pu values adjusted for the isotopic contribution of ^{242}Pu.	Y	HNF-11129, Revision 0, *Lower Limit of Detection (LLD) for the WRAP GEA Systems* (GEA-A & GEA-B)
Identify any/all instances where an LLD value for a *non-measured* radionuclide is not provided based on a lack of technical feasibility.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	There are no instances where an LLD value for a *non-measured* radionuclide is not provided based on a lack of technical feasibility.	Y	HNF-11129, Revision 0, *Lower Limit of Detection (LLD) for the WRAP GEA Systems* (GEA-A & GEA-B)
Are LLD values container/assay event specific or are typical LLD values applied to a class or type of wastes, i.e., those with similar attributes? If LLD values are not container/assay event specific identify the attributes or characteristics whereby waste containers are grouped.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	LLD values for GEA Units A and B are container/assay event specific.	Y	HNF-11129, Revision 0, *Lower Limit of Detection (LLD) for the WRAP GEA Systems* (GEA-A & GEA-B)

ATTACHMENT A.2 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Gamma Energy Analysis Systems A & B (GEA-A & GEA-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
TOTAL MEASUREMENT UNCERTAINTY (TMU)					
The method used to calculate the TMU for all required quantities must be documented and technically justified.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	TMU for the GEA Units A and B is technically justified and appropriately documented.	Y	HNF-4050, *Total Measurement Uncertainty for NDA at the WRAP Facility*, Revision 10
TMU determination accounts for all sources of uncertainty, specifically • Random errors • Calibration • Isotopic determination • Matrix inhomogeneity • Difference between calibration assumptions and actual waste • Non uniform source distribution • End effects • Self absorption • Transmission source • Self shielding • Neutron multiplication	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The TMU for the GEA Units system accounts for all relevant sources of uncertainty.	Y	HNF-4050, *Total Measurement Uncertainty for NDA at the WRAP Facility*, Revision 10
Methods to determine TMU must be documented, reviewed and approved by CBFO for each NDA instrument.	NA	Not Applicable	This was not assessed during this inspection.	NA	Not Applicable

ATTACHMENT A.2 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Gamma Energy Analysis Systems A & B (GEA-A & GEA-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
SYSTEM CALIBRATION					
Each NDA instrument must be calibrated before its initial use. Determine the date of the system's calibration of record and where this is documented.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Both GEA units were calibrated before their initial use. The date of the each system's calibration of record was established.	Y	HNF-5148, *Calibration Report for the WRAP Facility GEA System*, Revision 3 (GEA-A); HNF-5149, *Calibration Report for the WRAP Facility GEA System Unit B*, Revision 1A (GEA-B)
The range of applicability of the system 's calibration(s) must be specified in site procedures or other formal documentation. Identify the manner in which the range is expressed, i.e., curies or Pu/SNM mass for activity and salient physical characteristics for matrix.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The gamma energy and efficiency calibrations have the same range, from 59 to 1408 keV, and are applicable to both 55-gallon and 85-gallon overpack drums in shielded and unshielded geometries. This system was calibrated for two modes: Sum Spectrum and Sum of Segment NID. This is not a mass calibration in the strict sense and this system has no true upper mass limit, i.e., almost any mass value is measurable for energies within the range provided performance criteria for FWHM, dead time, etc. are met the are met. The system's operating range is stated as the LLD to 300 g ^{39}Pu for waste densities from 0.01 to 1.56 g/cc.	Y	HNF-5148, *Calibration Report for the WRAP Facility GEA System*, Revision 3 (GEA-A); HNF-5149, *Calibration Report for the WRAP Facility GEA System Unit B*, Revision 1A (GEA-B)
Any matrix/source surrogate waste combinations must be representative of the activity ranges and relevant waste matrix characteristics currently in use or planned for use by the system. The system must be calibrated to 100% recovery.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Gamma calibration included a PDP-style drum and surrogate matrices with densities of 0.011, 0.439, 0.657, and 1.56 g/cm^3. The matrices included foam, Homosote, Particle Board and sand. Moderator & absorber properties are not applicable for gamma systems.	Y	HNF-5148, *Calibration Report for the WRAP Facility GEA System*, Revision 3 (GEA-A); HNF-5149, *Calibration Report for the WRAP Facility GEA System Unit B*, Revision 1A (GEA-B)
The use of consensus standards for calibration is required, when such standards exist. If consensus standards do not exist, the calibration technique must be approved by CBFO.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The calibration reports for the GEA Units do not explicitly reference consensus standards. The calibration technique applied is technically adequate and has been approved by CBFO.	Y	HNF-5148, *Calibration Report for the WRAP Facility GEA System*, Revision 3 (GEA-A); HNF-5149, *Calibration Report for the WRAP Facility GEA System Unit B*, Revision 1A (GEA-B)

ATTACHMENT A.2 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Gamma Energy Analysis Systems A & B (GEA-A & GEA-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
Identify the specific consensus standards that were used for the system calibration or, in their absence, the alternate calibration technique. Evaluate the CBFO approval of the alternate technique.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	See preceding checklist entry.	NA	Not Applicable
Primary standards must be obtained from suppliers maintaining a nationally accredited measurement program. Identify the nationally accredited measurement program.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Primary Pu standards were obtained from the NMT-1 Analytical Chemistry Group of LANL; the gamma sources contained ^{152}Eu, ^{137}Cs and ^{241}Am and were obtained from North American Scientific Inc. Both organizations maintain a nationally accredited measurement program and copies of certificates for all sources are provided.	Y	HBF-9787, *WRAP NDA Certified Radioactive Sources*, Revision 0; HNF-5148, *Calibration Report for the WRAP Facility GEA System*, Revision 3 (GEA-A); HNF-5149, *Calibration Report for the WRAP Facility GEA System Unit B*, Revision 1A (GEA-B)
List the standards used for calibration and verify the pedigree of each standard.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	All standards used for calibration have been listed and the pedigree of each standard has been verified.	Y	HBF-9787, *WRAP NDA Certified Radioactive Sources*, Revision 0; HNF-5148, *Calibration Report for the WRAP Facility GEA System*, Revision 3 (GEA-A); HNF-5149, *Calibration Report for the WRAP Facility GEA System Unit B*, Revision 1A (GEA-B)
CALIBRATION VERIFICATION & CONFIRMATION					
Verification of an NDA instrument's calibration must be performed after any of the following occurrences: major system repairs and/or modifications, replacement of the system's components, significant changes to the system's software, and relocation of the system.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	A calibration verification for GEA-B was required due to a 3 a value exceeding the three sigma action limit.	Y	Memorandum 07-KIH-001

ATTACHMENT A.2 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Gamma Energy Analysis Systems A & B (GEA-A & GEA-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
Recalibration of the system must occur if the calibration verification demonstrates that the system's response has significantly changed.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The GEA Units A and B have not been recalibrated.	NA	Not Applicable.
The system calibration must be confirmed by performing replicate measurements of a non-interfering matrix.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The calibrations for the GEA Units A and B were confirmed using replicate measurements of a non-interfering matrix.	Y	HNF-5148, *Calibration Report for the WRAP Facility GEA System*, Revision 3 (GEA-A); HNF-5149, *Calibration Report for the WRAP Facility GEA System Unit B*, Revision 1A (GEA-B)
Replicate measurements must be performed with containers of the same nominal size and according to the same procedures used for actual waste assays.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Replicate measurements were performed with waste continers of the same size and according to the same operating procedures that are used for actual GEA A and B assays of routine TRU waste.	Y	HNF-5148, *Calibration Report for the WRAP Facility GEA System*, Revision 3 (GEA-A); HNF-5149, *Calibration Report for the WRAP Facility GEA System Unit B*, Revision 1A (GEA-B)
Replicate measurements must be performed using nationally recognized standards or standards derived from nationally recognized standards that span the range of use of the instrument with respect to disintegration rate and/or matrix effects. Identify all standards that were used and indicate their application (verification or confirmation).	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Replicate measurements were performed using nationally the appropriate radionuclide standards for both GEA Units that span the units' range of use with respect to disintegration rate and/or matrix effects. The radionuclide standards that were used and their application are listed.	Y	HNF-5148, *Calibration Report for the WRAP Facility GEA System*, Revision 3 (GEA-A); HNF-5149, *Calibration Report for the WRAP Facility GEA System Unit B*, Revision 1A (GEA-B)
Identify the nationally accredited measurement program. List the standards used for verification/confirmation and verify	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*,	Primary Pu standards were obtained from the NMT-1 Analytical Chemistry Group of LANL; the gamma sources contained ^{152}Eu, ^{137}Cs and ^{241}Am and were obtained from North American Scientific Inc. Both organizations maintain a	Y	HNF-5148, *Calibration Report for the WRAP Facility GEA System*, Revision 3 (GEA-A); HNF-5149, *Calibration Report for the WRAP*

ATTACHMENT A.2 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Gamma Energy Analysis Systems A & B (GEA-A & GEA-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
the pedigree of each standard.		Appendix E	nationally accredited measurement program		*Facility GEA System Unit B*, Revision 1A (GEA-B);HNF-9787, *WRAP NDA Certified Radioactive Sources*, Revision 0-B
The standards used for calibration confirmation must not be the same sources as those used for the system's calibration of record.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Calibration confirmation was performed using Pu sources other than the $^{152}Eu/^{137}Cs/^{241}Am$ sources used for the systems' calibration, as required by DOE/WIPP-02-3122.	Y	HNF-5148, *Calibration Report for the WRAP Facility GEA System*, Revision 3 (GEA-A); HNF-5149, *Calibration Report for the WRAP Facility GEA System Unit B*, Revision 1A (GEA-B); HNF-9787, *WRAP NDA Certified Radioactive Sources*, Revision 0-B
Requirements for accuracy, expressed as %R, and precision, expressed as %RSD, must be met as specified in DOE/WIPP-02-3122, Appendix A, Table A-3.2 for precision and ±30% for accuracy.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Requirements for accuracy (expressed as %R) and precision (expressed as %RSD), as specified in DOE/WIPP-02-3122, Appendix A, Table A-3.2, were met.	Y	HNF-9787, *WRAP NDA Certified Radioactive Sources*, Revision 0-B

ATTACHMENT A.2 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Gamma Energy Analysis Systems A & B (GEA-A & GEA-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
QUALITY CONTROL					
All radioassay and data validation must be performed by appropriately trained and qualified personnel.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	All personnel performing radioassay and data validation are appropriately trained and qualified.	Y	*People in Classification SUMMARY for WRAP NDA Scientists* provided Monday, June 4, 2007 during inspection.
Identify the name, title and function of all personnel performing NDA data validation.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The name, title and function of all personnel performing NDA data validation have been provided	Y	*People in Classification SUMMARY for WRAP NDA Scientists* provided Monday, June 4, 2007 during inspection.
Requalification of personnel must be based on evidence of continued satisfactory performance and must be performed at least every two years.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Personnel requalification is based on evidence of continued satisfactory performance and is performed at least every two years.	Y	TRU Training Records and TRU Training Database
The site must participate in relevant measurement comparison programs sponsored or approved by CBFO, including the NDA PDP.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The GEA systems participated successfully in Cycle 13A of the CBFO sponsored NDA PDP. Both systems will participate in Cycle 14A.	Y	PDP certification letter from M. Brown, CBFO
BACKGROUND AND PERFORMANCE CHECKS					
Assay system background measurements must be taken daily, unless otherwise approved by CBFO. Determine the form of CBFO approval documentation of the alternate approach to backgrounds, if applicable. Contributions to backgrounds from nearby radiation sources must be carefully controlled, or more frequent backgrounds must be	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Background checks are performed daily in accordance with WRPI-OP-0906 and WRPI-OP-0907. Control charts are included in GEA BDRs.	Y	WMP-350, Section 2.8, *WRAP NDA Measurement Control Program,* Revision 5; GEA BDRs WR-TB-2007-082; WR-TB-2007-091; WR-TB-2007-092; WR-TB-2006-228; WR-TB-2006-294, WR-TB-2007-091; WR-TB-2006-198

ATTACHMENT A.2 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Gamma Energy Analysis Systems A & B (GEA-A & GEA-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
measured.					
Assess how often background radiation was problematic to the extent that measurement personnel had to make adjustments.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The GEA BDRs evaluated do not indicate problematic backgrounds.	Y	WMP-350, Section 2.8, *WRAP NDA Measurement Control Program,* Revision 5; GEA BDRs WR-TB-2007-082; WR-TB-2007-091; WR-TB-2007-092; WR-TB-2006-228; WR-TB-2006-294, WR-TB-2007-091; WR-TB-2006-198
Identify the criteria used to evaluate instrument backgrounds and assess the technical adequacy of this criterion, i.e., statistical or administrative.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The criteria used to assess backgrounds are derived in WMP-350, Section 2.8, Appendix A	Y	WMP-350, Section 2.8, *WRAP NDA Measurement Control Program,* Revision 5
Identify the number of data points required to derive the initial control limit. At what interval(s) will new limits be calculated?	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	A minimum of 9 data points is used to establish initial control limits. Limits are updates at the discretion of the NDA cognizant engineer	Y	WMP-350, Section 2.8, *WRAP NDA Measurement Control Program,* Revision 5
System performance checks must be performed at least once per operational day.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Quality Control (QC) calibration checks are performed daily in accordance with WRPI-OP-0906 and WRPI-OP-0907. Control charts are included in GEA BDRs.	Y	GEA BDRs WR-TB-2007-082; WR-TB-2007-091; WR-TB-2007-092; WR-TB-2006-228; WR-TB-2006-294, WR-TB-2007-091; WR-TB-2006-198
System performance checks must include, as applicable, efficiency, matrix correction checks, and systems peak position and resolution for spectrometric systems.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Performance checks include the centroid and the full width half-maximum (FWHM) of the 129 and/or 414 keV ^{239}Pu peak and an efficiency (cpm/dpm) check.	Y	WMP-350, Section 2.2, Revision 27; WMP-350, Section 2.8, *WRAP NDA Measurement Control Program,* Revision 5
At a minimum of once per operational week an interfering	Y	HNF-2600, Revision 19, *Hanford Site Transuranic*	Weekly Interfering Matrix checks are performed in accordance with WRPI-OP-0907 and WMP-350, Section	Y	WMP-350, Section 2.3, Revision 23; HNF-9787, *WRAP NDA*

ATTACHMENT A.2 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Gamma Energy Analysis Systems A & B (GEA-A & GEA-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
matrix must be assayed to assess the long-term stability of the NDA instrument and its matrix corrections and how this performance is documented.		*Waste Certification Plan*, Appendix E	2.8. GEA BDRs contained evidence of the weekly interfering matrix checks.		*Certified Radioactive Sources*, Revision 0-B; GEA BDRs WR-TB-2007-082; WR-TB-2007-091; WR-TB-2007-092; WR-TB-2006-228; WR-TB-2006-294, WR-TB-2007-091; WR-TB-2006-198
Interfering surrogate waste matrices must be constructed in a way that the salient matrix characteristics do not change over time.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	WMP-350, Section 2.3 requires daily performance checks and weekly interfering matrix checks that are recorded on control charts and included with BDRs. List of NDA batches from GEA systems since 7/1/06.	Y	WMP-350, Section 2.3, Revision 23; HNF-9787, *WRAP NDA Certified Radioactive Sources*, Revision 0-B; GEA BDRs WR-TB-2007-082; WR-TB-2007-091; WR-TB-2007-092; WR-TB-2006-228; WR-TB-2006-294, WR-TB-2007-091; WR-TB-2006-198
The radionuclide sources used for performance checks must be long-lived and of sufficient strength (activity) to provide statistically sufficient results over a short measurement time.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The radionuclide sources used for performance checks are technically adequate.	Y	WMP-350, Section 2.3, Revision 23; HNF-9787, *WRAP NDA Certified Radioactive Sources*, Revision 0-B
Radioactive sources are decay corrected as a function of their physical half life, as appropriate, specifically ^{133}Ba, ^{252}Cf, ^{137}Cs, ^{75}Se and ^{109}Cd.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Radioactive sources are decay corrected as a function of their physical half-life.	Y	HNF-9787, *WRAP NDA Certified Radioactive Sources*, Revision 0-B; WMP-350, Section 2.2, Revision 27
Performance checks must be quantitative and based on 2 and 3 sigma limits.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Measurement control limits are statistically based ± 2σ Warning Limits and ± 3σ Control Limits. GEA BDRs contained evidence of successful performance checks.	Y	WMP-350, Section 2.3, Revision 23; GEA BDRs WR-TB-2007-082; WR-TB-2007-091; WR-TB-2007-092; WR-TB-2006-228; WR-TB-2006-294, WR-TB-2007-091; WR-TB-2006-198

ATTACHMENT A.2 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Gamma Energy Analysis Systems A & B (GEA-A & GEA-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
DATA MANAGEMENT					
All radioassay data must be reviewed and approved by qualified personnel before being reported to WWIS.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	All radioassay data has been reviewed and approved by qualified personnel before being reported to WWIS.	Y	GEA BDRs WR-TB-2007-082; WR-TB-2007-091; WR-TB-2007-092; WR-TB-2006-228; WR-TB-2006-294, WR-TB-2007-091; WR-TB-2006-198
Identify the name, title and function of the individual(s) performing technical review and approval of NDA BRDs.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The name, title and function of the individuals performing technical review and approval of NDA BRDs were provided.	Y	*People in Classification SUMMARY for WRAP NDA Scientists* provided Monday, June 4, 2007 during inspection.
Radioassay BDRs must consist of the following elements: • Testing facility name, testing batch number, container numbers, and signature of the Site Project Officer (SPO) or designee(s) • Table of Contents • Background and performance check data or control charts for the relevant time period. • Data validation per the QAPD and site procedures • Separate testing report sheets for each container.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	GEA Aand B BDRs reviewed during the inspection included: • Testing facility name, batch number, container numbers, and signature of the Hanford Site Project Officer • Table of Contents • Background, performance check data and control charts • Data validation per HNF-2600, Revision 19 • Separate testing report sheets for each container.	Y	GEA BDRs WR-TB-2007-082; WR-TB-2007-091; WR-TB-2007-092; WR-TB-2006-228; WR-TB-2006-294, WR-TB-2007-091; WR-TB-2006-198
Radioassay data sheets must include: • Title "Radioassay Data	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	GEA A and B Testing report sheets include: • Title "Radioassay Data Sheet" • Method/procedure used	Y	GEA BDRs WR-TB-2007-082; WR-TB-2007-091; WR-TB-2007-092; WR-TB-2006-228; WR-TB-2006-294, WR-TB-

ATTACHMENT A.2 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Gamma Energy Analysis Systems A & B (GEA-A & GEA-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
Sheet" • Method/procedure used • Date of radioassay • Activities and associated TMU for individual radionuclides • TRU alpha concentration and its associated TMU • Operator signature • Reviewer signature			• Date of radioassay • Activities and associated TMU for individual radionuclides • TRU alpha concentration and its associated TMU • Operator signature • Reviewer signature		2007-091; WR-TB-2006-198
The following nonpermanent records must be maintained at the radioassay-testing facility or forwarded to the site project office: • Testing batch reports • All raw data, including instrument readouts, calculation records, and radioassay QC results • All applicable instrument calibration reports	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	SHENCA data are backed up with the BRDs on compact discs. Validated BDRs are retained in the Hanford TRU Records Center.	Y	Discussions with N. Abdurrahman and observation of records

ATTACHMENT A.3 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Imaging Passive-Active Neutron Counters Units A and B (IPAN-A and IPAN-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
SYSTEM DESCRIPTION					
Identify the NDA system by name, location and number, as appropriate.	NA	General system information	The IPAN Units A and B are essentially identical systems that are located in the WRAP facility. These units have not been relocated since their initial use at Hanford.	NA	Physical observation of the IPAN units art WRAP during this and previous EPA inspections.
Describe the system's operational history including deployment at other DOE sites.	NA	General system information	Both IPAN units have had minimal use for WIPP assays in the last year	NA	Previous EPA inspections that included the IPAN Units A and B
For systems that have been deployed at multiple DOE sites document pertinent aspects of each system's development, e.g., installation of new or different detectors, software or other relevant features.	NA	General system information	Neither IPAN unit was previously deployed at other DOE Sites.	NA	Not Applicable
SYSTEM PERFORMANCE					
Identify the period of performance relevant to this inspection and if this NDA system has prior EPA approval(s).	NA	General scoping information	Both IPAN units have had minimal use in the last year.	Y	Discussion with N. Abdurrahman during inspection and evaluation of IPAN BDRs cited in the next checklist entry
Identify the number of waste containers this system assayed during the period of performance. Of these, indicate how many Batch Data Reports (BDRs) were assembled. Of the assembled BDRs, indicate how many have been promoted through Project Level Review and are available for evaluation during this inspection.	NA	General scoping information	Approximately 21 containers have been assayed on IPAN A and validated to produce 5 BDRs that have been promoted through SPO validation. One BDR was produced for IPAN B directly following the inspection.	Y	IPAN BDRs WR-TB-2006-189, WR-TB-2006-194, WR-TB-2006-198, WR-TB-2006-247 and WR-TB-2006-264

ATTACHMENT A.3 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Imaging Passive-Active Neutron Counters Units A and B (IPAN-A and IPAN-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
GENERAL REPORTING REQUIREMENTS					
Assay systems must report quantitative values and uncertainties for ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{241}Am, ^{233}U, ^{234}U, ^{238}U, ^{90}Sr, and ^{137}Cs.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Quantitative values and uncertainties for ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{241}Am, ^{233}U, ^{234}U, ^{238}U, ^{90}Sr, and ^{137}Cs are reported.	Y	HNF-16729, *WRAP IPAN System Calibration Test Report*, Revision 1; WMP-350, Section 2.2, Revision 27
Each container characterized and intended for disposal at WIPP must contain TRU waste.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Containers assayed on the IPAN Units A and B meet the definition of TRU waste, i.e., contain greater than 100 nCi/g of TRU alpha activity	Y	HNF-16729, WRAP IPAN System Calibration Test Report, Revision 1; WMP-350, Section 2.2, Revision 27
NDA instruments and procedures are appropriate for the waste streams being assayed.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	IPAN units and their supporting procedures are appropriate for the heterogeneous debris and solid wastes currently being assayed	Y	WMP-350: Section 2.2, Revision.27; Section 2.3, Revision 23; Section 2.8, Revision 5; & Section 2.9, Revision 2. WRP1-OP-0905, Revision E, Change 6
NDA instruments and procedures result in unbiased values for the cumulative activity of the WIPP radionuclide inventory.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The radioassay values observed in the IPAN BDRs were acceptable	Y	HNF-16729, *WRAP IPAN System Calibration Test Report*, Revision 1
Some radionuclides are derived by the application of scaling factors or correlation techniques. Identify all radionuclides that are quantified in this manner.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Values for ^{90}Sr ^{242}Pu, ^{234}U and ^{90}Sr are derived using scaling factors.	Y	HNF-16729, *WRAP IPAN System Calibration Test Report*, Revision 1; WMP-350, Section 2.2, Revision 27; WP1-OP-0905, Revision E, Change 6
Assess the technical adequacy of the calculations involving the application of scaling factors and/or correlation techniques.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The application of radionuclide scaling factors for ^{242}Pu, ^{234}U and ^{90}Sr is technically adequate.	Y	HNF-16729, *WRAP IPAN System Calibration Test Report*, Revision 1; WMP-350, Section 2.2, Revision 27

ATTACHMENT A.3 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Imaging Passive-Active Neutron Counters Units A and B (IPAN-A and IPAN-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
Identify the procedures that govern this function and where the results of these calculations are documented.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	This function is addressed in WMP-350, Section 2.2, and the results are documented in the IPAN BDRs.	Y	HNF-16729, *WRAP IPAN System Calibration Test Report*, Revision 1; WMP-350, Section 2.2, Revision 27
ACCEPTABLE KNOWLEDGE (AK)					
If isotopic ratios based on AK are used the values are qualified by confirmatory testing.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Isotopic determination is performed using the GEA Units A and B	Y	WMP-350, Section 2.2, Revision 27; see checklist for GEA Units A and B
Do NDA personnel use AK derived isotopic values to calculate radionuclide values? If so, is this function performed according to a formal procedure? Assess the technical adequacy of this process(s).	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Isotopic determination is performed using the GEA Units A and B	Y	WMP-350, Section 2.2, Revision 27; see checklist for GEA Units A and B
Identify the procedure and where the results of these calculations are documented.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Isotopic determination is performed using the GEA Units A and B	Y	WMP-350, Section 2.2, Revision 27; see checklist for GEA Units A and B
ISOTOPIC DETERMINATION					
Identify the radionuclides that are measured directly and the specific radiation type (γ, AN or PN) that is measured.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Isotopic determinations are gamma based and are performed on the GEA Units A and B. The IPAN Units A and B provide both active and passive neutron values.	Y	WMP-350, Section 2.2, Revision 27; see checklist for GEA Units A and B
Identify the method(s) used to derive the isotopic contribution for the unmeasured radionuclides, e.g., MGA, PC FRAM or other technique.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Isotopic determination is performed using the GEA Units A and B	Y	WMP-350, Section 2.2, Revision 27; see checklist for GEA Units A and B

ATTACHMENT A.3 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Imaging Passive-Active Neutron Counters Units A and B (IPAN-A and IPAN-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
LOWER LEVEL OF DETECTION (LLD)					
The LLD for each NDA system must be determined. For multi modal systems this may require a separate determination for each mode, i.e., active neutron, passive neutron and gamma.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The LLDs for both IPAN Units system have been determined and are documented.	Y	HNF-16729, *WRAP IPAN System Calibration Test Report*, Revision 1
Site-specific environmental backgrounds and container-specific interferences must be accounted for in LLD determinations.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Site-specific environmental backgrounds and container specific interferences are accounted for in LLD determinations for both IPAN Units.	Y	HNF-16729, *WRAP IPAN System Calibration Test Report*, Revision 1
NDA instruments performing TRU/Non-TRU waste discrimination measurements are required to have a LLD no greater than 100 nCi/g.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The IPAN A and B Units have the required sensitivity to discriminate at 100 nCi/g. Only assay values above the LLD will be reported.	Y	HNF-16729, *WRAP IPAN System Calibration Test Report*, Revision 1
The technical basis and derivation for LLDs must be adequate and appropriately documented.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The technical bases for the LLDs for both IPAN units are technically adequate and are appropriately documented.	Y	HNF-16729, *WRAP IPAN System Calibration Test Report*, Revision 1
For radionuclides that are not determined primarily by measurement an LLD analog, i.e., a reporting threshold must be used when it is technically feasible. Identify all instances when this occurs and the form of the documentation of these activities.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	LLD values for ^{234}U and ^{90}Sr are derived by application of radionuclide-specific scaling factors to the LLDs for measured values of primary radionuclides, i.e., ^{235}U and ^{238}U for ^{234}U, and ^{137}Cs for ^{90}Sr. LLDs for ^{242}Pu are based on measured Pu values adjusted for the isotopic contribution of ^{242}Pu.	Y	HNF-16729, *WRAP IPAN System Calibration Test Report*, Revision 1

ATTACHMENT A.3 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Imaging Passive-Active Neutron Counters Units A and B (IPAN-A and IPAN-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
Identify any/all instances where an LLD value for a *non-measured* radionuclide is not provided based on a lack of technical feasibility.		HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	There are no instances where an LLD value for a *non-measured* radionuclide is not provided based on a lack of technical feasibility.		HNF-16729, *WRAP IPAN System Calibration Test Report*, Revision 1
Are LLD values container/assay event specific or are typical LLD values applied to a class or type of wastes, i.e., those with similar attributes? If LLD values are not container/assay event specific identify the attributes or characteristics whereby waste containers are grouped.		HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	LLD values for IPAN Units A and B are container or assay event specific.		HNF-16729, *WRAP IPAN System Calibration Test Report*, Revision 1
TOTAL MEASUREMENT UNCERTAINTY (TMU)					
The method used to calculate the TMU for all required quantities must be documented and technically justified.		HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	TMU for the IPAN Units A and B is technically justified and appropriately documented.		HNF-16730, *WRAP Drum IPAN Systems TMU Report*, Revision 0
TMU determination accounts for all sources of uncertainty, specifically • Random errors • Calibration • Isotopic determination • Matrix inhomogeneity • Difference between calibration assumptions and actual waste • Non uniform source distribution • End effects		HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The TMU for the IPAN Units system accounts for all relevant sources of uncertainty.		HNF-16730, *WRAP Drum IPAN Systems TMU Report*, Revision 0

ATTACHMENT A.3 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Imaging Passive-Active Neutron Counters Units A and B (IPAN-A and IPAN-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
• Self absorption • Transmission source • Self shielding • Neutron multiplication					
Methods to determine TMU must be documented, reviewed and approved by CBFO for each NDA instrument.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The SHENCA's TMU includes all significant sources of uncertainty. Algorithms for the SuperHENC TMU calculation are in the system's software that is provided by the manufacturer.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA),* HNF-26085, Revision 1; Section 4.14. TMU calculations are addressed in WMP-350, Section 2.2, *Calculation of Assay Results*, Revision 27
Methods to determine TMU must be documented, reviewed and approved by CBFO for each NDA instrument.	NA	Not Applicable	This was not assessed during this inspection.	NA	Not Applicable

ATTACHMENT A.3 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Imaging Passive-Active Neutron Counters Units A and B (IPAN-A and IPAN-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
SYSTEM CALIBRATION					
Each NDA instrument must be calibrated before its initial use. Determine the date of the system's calibration of record and where this is documented.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Both IPAN units were calibrated before their initial use. The date of the each system's calibration of record was established.	Y	HNF-16729, *WRAP IPAN System Calibration Test Report*, Revision 1
The range of applicability of the system 's calibration(s) must be specified in site procedures or other formal documentation. Identify the manner in which the range is expressed, i.e., curies or Pu/SNM mass for activity and salient physical characteristics for matrix.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The ranges of applicability of the both IPAN's calibrations are specified in the IPAN calibration report. Identify the manner in which the range is expressed, i.e., curies or Pu/SNM mass for activity and salient physical characteristics for matrix.	Y	HNF-16729, *WRAP IPAN System Calibration Test Report*, Revision 1
Any matrix/source surrogate waste combinations must be representative of the activity ranges and relevant waste matrix characteristics currently in use or planned for use by the system. The system must be calibrated to 100% recovery.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The matrix/source surrogate waste combinations are representative of the activity ranges and waste matrices for which the IPAN units are currently calibrated. Both IPAN units are calibrated to 100% recovery.	Y	HNF-16729, *WRAP IPAN System Calibration Test Report*, Revision 1
The use of consensus standards for calibration is required, when such standards exist. If consensus standards do not exist, the calibration technique must be approved by CBFO.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The consensus standards referenced include ASTM C1316-95 and ANSI N15.36-1994.	Y	HNF-16729, *WRAP IPAN System Calibration Test Report*, Revision 1
Identify the specific consensus standards that were used for the system calibration or, in their absence, the alternate calibration technique. Evaluate the CBFO approval of the	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	See preceding checklist entry.	Y	HNF-16729, Revision 1, WRAP IPAN System Calibration Test Report; WRPI-OP-0905, Revision E, Change 6

ATTACHMENT A.3 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Imaging Passive-Active Neutron Counters Units A and B (IPAN-A and IPAN-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
alternate technique.					
Primary standards must be obtained from suppliers maintaining a nationally accredited measurement program. Identify the nationally accredited measurement program.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Primary Pu standards were obtained from the NMT-1 Analytical Chemistry Group of LANL, an organization that maintains a nationally accredited measurement program. Copies of certificates for all sources are provided.	Y	HNF-16729, *WRAP IPAN System Calibration Test Report*, Revision 1; HNF-9787, *WRAP NDA Certified Radioactive Sources*, Revision 0-A
List the standards used for calibration and verify the pedigree of each standard.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	All standards used for calibration have been listed and the pedigree of each standard has been verified.	Y	HNF-16729, *WRAP IPAN System Calibration Test Report*, Revision 1; HNF-9787, *WRAP NDA Certified Radioactive Sources*, Revision 0-A
CALIBRATION VERIFICATION & CONFIRMATION					
Verification of an NDA instrument's calibration must be performed after any of the following occurrences: major system repairs and/or modifications, replacement of the system's components, significant changes to the system's software, and relocation of the system.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	A calibration verification was performed for IPAN-B due to the replacement of a neutron tube.	Y	Memo 06-KIH-006.
Recalibration of the system must occur if the calibration verification demonstrates that the system's response has significantly changed.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The IPAN Units have not been recalibrated.	Y	Not Applicable
The system calibration must be confirmed by performing replicate measurements of a non-interfering matrix.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The calibrations for the IPAN Units A and B were confirmed using replicate measurements of a non-interfering matrix.	Y	HNF-16729, *WRAP IPAN System Calibration Test Report*, Revision 1
Replicate measurements must be performed with containers of the same	Y	HNF-2600, Revision 19, *Hanford Site Transuranic*	Replicate measurements were performed with waste containers of the same size and according to the same	Y	HNF-16729, *WRAP IPAN System*

ATTACHMENT A.3 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Imaging Passive-Active Neutron Counters Units A and B (IPAN-A and IPAN-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
nominal size and according to the same procedures used for actual waste assays.		*Waste Certification Plan*, Appendix E	operating procedures that are used for actual IPAN A and B assays of routine TRU waste.		*Calibration Test Report*, Revision 1
Replicate measurements must be performed using nationally recognized standards or standards derived from nationally recognized standards that span the range of use of the instrument with respect to disintegration rate and/or matrix effects. Identify all standards that were used and indicate their application (verification or confirmation).	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Replicate measurements were performed using nationally the appropriate radionuclide standards for both IPN Units that span the units' range of use with respect to disintegration rate and/or matrix effects. The radionuclide standards that were used and their application are listed.	Y	HNF-16729, *WRAP IPAN System Calibration Test Report*, Revision 1
Identify the nationally accredited measurement program. List the standards used for verification/confirmation and verify the pedigree of each standard.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Primary Pu standards were obtained from the NMT-1 Analytical Chemistry Group of LANL, n organization that maintains a nationally accredited measurement program.	Y	HNF-16729, *WRAP IPAN System Calibration Test Report*, Revision 1
The standards used for calibration confirmation must not be the same sources as those used for the system's calibration of record.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The standards used for calibration confirmation were different than those used for the initial calibration for both IPAN units.	Y	HNF-16729, *WRAP IPAN System Calibration Test Report*, Revision 1; HNF-9787, *WRAP NDA Certified Radioactive Sources*, Revision 0-A
Requirements for accuracy, expressed as %R, and precision, expressed as %RSD, must be met as specified in DOE/WIPP-02-3122, Appendix A, Table A-3.2 for precision and ±30% for accuracy.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Requirements for accuracy (expressed as %R) and precision (expressed as %RSD), as specified in DOE/WIPP-02-3122, Appendix A, Table A-3.2, were met.	Y	HNF-16729, *WRAP IPAN System Calibration Test Report*, Revision 1

ATTACHMENT A.3 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Imaging Passive-Active Neutron Counters Units A and B (IPAN-A and IPAN-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
QUALITY CONTROL					
All radioassay and data validation must be performed by appropriately trained and qualified personnel.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	All personnel performing radioassay and data validation are appropriately trained and qualified.	Y	*People in Classification SUMMARY for WRAP NDA Scientists* provided Monday, June 4, 2007 during inspection
Identify the name, title and function of all personnel performing NDA data validation.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The name, title and function of all personnel performing NDA data validation have been provided	Y	*People in Classification SUMMARY for WRAP NDA Scientists* provided Monday, June 4, 2007 during inspection
Requalification of personnel must be based on evidence of continued satisfactory performance and must be performed at least every two years.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Personnel requalification is based on evidence of continued satisfactory performance and is performed at least every two years.	Y	TRU Training Records and TRU Training Database
The site must participate in relevant measurement comparison programs sponsored or approved by CBFO, including the NDA PDP.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The IPAN systems successfully participated in Cycle 13A of the CBFO sponsored NDA PDP. Both IPAN systems will participate in Cycle 14A.	Y	PDP certification letter from M. Brown, CBFO
BACKGROUND AND PERFORMANCE CHECKS					
Assay system background measurements must be taken daily, unless otherwise approved by CBFO. Determine the form of CBFO approval documentation of the alternate approach to backgrounds, if applicable. Contributions to backgrounds from nearby radiation sources must be carefully controlled, or more frequent backgrounds must be measured.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Performance of daily background measurements is required by WRP1-OP-0905. Control charts showing these measurements are included with all IPAN BDRs.	Y	IPAN BDRs: WR-TB-2006-189; WR-TB-2006-194; WR-TB-2006-198; WR-TB-2006-247; and WR-TB-2006-264

ATTACHMENT A.3 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Imaging Passive-Active Neutron Counters Units A and B (IPAN-A and IPAN-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
Assess how often background radiation was problematic to the extent that measurement personnel had to make adjustments.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The IPAN BDRs evaluated do not indicate problematic backgrounds	Y	IPAN BDRs: WR-TB-2006-189; WR-TB-2006-194; WR-TB-2006-198; WR-TB-2006-247; and WR-TB-2006-264
Identify the criteria used to evaluate instrument backgrounds and assess the technical adequacy of this criterion, i.e., statistical or administrative.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The criteria used to evaluate instrument backgrounds and their derivations are specified and they are technically adequate.	Y	WMP-350, Section 2.8, *WRAP NDA Measurement Control Program,* Revision 5, Appendix A
Identify the number of data points required to derive the initial control limit. At what interval(s) will new limits be calculated?	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The number of data points required to derive the new control limit is specified.	Y	WMP-350, Section 2.8, *WRAP NDA Measurement Control Program,* Revision 5, Appendix A
System performance checks must be performed at least once per operational day.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	WRP1-OP-0905 and WMP-350, Section 2.3 require daily performance checks that are recorded on control charts and included with BDRs. IPAN BDRs document the performance of these checks.	Y	WMP-350, Section 2.8, *WRAP NDA Measurement Control Program,* Revision 5, Appendix A IPAN BDRs: WR-TB-2006-189; WR-TB-2006-194; WR-TB-2006-198; WR-TB-2006-247; and WR-TB-2006-264
System performance checks must include, as applicable, efficiency, matrix correction checks, and systems peak position and resolution for spectrometric systems.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Performance checks for the IPAN units include an efficiency check for both active and passive modes and a neutron generator check. IPAN BDRs document the performance of these checks.	Y	WMP-350, Section 2.8, *WRAP NDA Measurement Control Program,* Revision 5, Appendix A; IPAN BDRs: WR-TB-2006-189; WR-TB-2006-194; WR-TB-2006-198; WR-TB-2006-247; and WR-TB-2006-264
At a minimum of once per operational week an interfering matrix must be assayed to assess the long-term stability of the NDA instrument and its matrix corrections and how this	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Weekly Interfering Matrix checks are performed in accordance with WRPI-OP-0905 and WMP-350, Section 2.8. IPAN BDRs contained evidence of the weekly interfering matrix checks.	Y	WMP-350, Section 2.8, *WRAP NDA Measurement Control Program,* Revision 5, Appendix A; IPAN BDRs: WR-TB-2006-189; WR-TB-2006-194; WR-TB-

ATTACHMENT A.3 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Imaging Passive-Active Neutron Counters Units A and B (IPAN-A and IPAN-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
performance is documented.					2006-198; WR-TB-2006-247; and WR-TB-2006-264
Interfering surrogate waste matrices must be constructed in a way that the salient matrix characteristics do not change over time.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	WRP1-OP-0905 and WMP-350, Section 2.3 require daily performance checks and weekly interfering matrix checks that are recorded on control charts and included with the IPAN BDRs.	Y	IPAN BDRs: WR-TB-2006-189; WR-TB-2006-194; WR-TB-2006-198; WR-TB-2006-247; and WR-TB-2006-264
The radionuclide sources used for performance checks must be long-lived and of sufficient strength (activity) to provide statistically sufficient results over a short measurement time.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The radionuclide sources used for performance checks are technically adequate.	Y	HNF-9787, *WRAP NDA Certified Radioactive Sources*, Revision 0-A
Radioactive sources are decay corrected as a function of their physical half life, as appropriate, specifically ^{133}Ba, ^{252}Cf, ^{137}Cs, ^{75}Se and ^{109}Cd.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Radioactive sources are decay corrected as a function of their physical half-life.	Y	HNF-9787, *WRAP NDA Certified Radioactive Sources*, Revision 0-A
Performance checks must be quantitative and based on 2 and 3 sigma limits.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Measurement control limits are statistically based $\pm 2\sigma$ Warning Limits and $\pm 3\sigma$ Control Limits as required in WRP1-OP-0905. IPAN BDRs contained evidence of successful performance checks.	Y	IPAN BDRs: WR-TB-2006-189; WR-TB-2006-194; WR-TB-2006-198; WR-TB-2006-247; and WR-TB-2006-264

ATTACHMENT A.3 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Imaging Passive-Active Neutron Counters Units A and B (IPAN-A and IPAN-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
DATA MANAGEMENT					
All radioassay data must be reviewed and approved by qualified personnel before being reported to WWIS.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	All radioassay data has been reviewed and approved by qualified personnel before being reported to WWIS.	Y	IPAN BDRs: WR-TB-2006-189; WR-TB-2006-194; WR-TB-2006-198; WR-TB-2006-247; and WR-TB-2006-264
Identify the name, title and function of the individual(s) performing technical review and approval of NDA BRDs.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The name, title and function of the individuals performing technical review and approval of NDA BRDs were provided.	Y	*People in Classification SUMMARY for WRAP NDA Scientists* provided Monday, June 4, 2007 during inspection.
Radioassay BDRs must consist of the following elements: • Testing facility name, testing batch number, container numbers, and signature of the Site Project Officer (SPO) or designee(s) • Table of Contents • Background and performance check data or control charts for the relevant time period. • Data validation per the QAPD and site procedures • Separate testing report sheets for each container.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	IPAN A and B BDRs reviewed during the inspection included: • Testing facility name, batch number, container numbers, and signature of the Hanford Site Project Officer • Table of Contents • Background, performance check data and control charts • Data validation per HNF-2600, Revision 19 • Separate testing report sheets for each container.	Y	IPAN BDRs: WR-TB-2006-189; WR-TB-2006-194; WR-TB-2006-198; WR-TB-2006-247; and WR-TB-2006-264
Radioassay data sheets must include: • Title "Radioassay Data Sheet" • Method/procedure used • Date of radioassay	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	IPN A and B Testing report sheets include: • Title "Radioassay Data Sheet" • Method/procedure used • Date of radioassay	Y	IPAN BDRs: WR-TB-2006-189; WR-TB-2006-194; WR-TB-2006-198; WR-TB-2006-247; and WR-TB-2006-264

ATTACHMENT A.3 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: WRAP Imaging Passive-Active Neutron Counters Units A and B (IPAN-A and IPAN-B)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
• Activities and associated TMU for individual radionuclides • TRU alpha concentration and its associated TMU • Operator signature • Reviewer signature			• Activities and associated TMU for individual radionuclides • TRU alpha concentration and its associated TMU • Operator signature • Reviewer signature		
The following nonpermanent records must be maintained at the radioassay-testing facility or forwarded to the site project office: • Testing batch reports • All raw data, including instrument readouts, calculation records, and radioassay QC results • All applicable instrument calibration reports	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	IPAN data are backed up with the BRDs on compact discs. Validated BDRs are retained in the Hanford TRU Records Center	Y	Discussions with N. Abdurrahman and observation of records

ATTACHMENT A.4 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: Super-High Efficiency Neutron Counter A (SHENCA)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
SYSTEM DESCRIPTION					
Identify the NDA system by name, location and number, as appropriate.	NA	General system information	The SHENCA is housed in trailer No. MO-610 that is currently located north of the WRAP facility.	NA	Physical observation of the SHENCA in operation is the designated location
Describe the system's operational history including deployment at other DOE sites.	NA	General system information	The SHENCA has been operational continuously in the same location since the last EPA inspection.	NA	Previous EPA inspections that included the SHENCA
For systems that have been deployed at multiple DOE sites document pertinent aspects of each system's development, e.g., installation of new or different detectors, software or other relevant features.	NA	General system information	The SHENCA has not been deployed at other DOE Sites.	NA	Not Applicable
SYSTEM PERFORMANCE					
Identify the period of performance relevant to this inspection and if this NDA system has prior EPA approval(s).	NA	General scoping information	The SHENCA has been operational continuously since the last EPA inspection.	Y	Discussion with N. Abdurrahman during inspection and evaluation of SHENCA BDRs cited in the next checklist entry
Identify the number of waste containers this system assayed during the period of performance. Of these, indicate how many Batch Data Reports (BDRs) were assembled. Of the assembled BDRs, indicate how many have been promoted through Project Level Review and are available for evaluation during this inspection.	NA	General scoping information	Approximately 92 SWBs have been assayed and these have been assembled into 29 batches, 16 of which have been promoted through project level validation.	Y	SHENCA BDRs WR-TB-2006-180 SWB, WR-TB-2007-204, and WR-TB-2006-299

ATTACHMENT A.4 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: Super-High Efficiency Neutron Counter A (SHENCA)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
GENERAL REPORTING REQUIREMENTS					
Assay systems must report quantitative values and uncertainties for ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{241}Am, ^{233}U, ^{234}U, ^{238}U, ^{90}Sr, and ^{137}Cs.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Quantitative values and uncertainties for ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{241}Am, ^{233}U, ^{234}U, ^{238}U, ^{90}Sr, and ^{137}Cs are reported.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA),* HNF-26085, Revision 1; BDRs WR-TB-2006-180 SWB, WR-TB-2007-204, and WR-TB-2006-299
Each container characterized and intended for disposal at WIPP must contain TRU waste.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Containers assayed on the SHENCA meet the definition of TRU waste, i.e., contain greater than 100 nCi/g of TRU alpha activity	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA),* HNF-26085, Revision 1; SHENCA BDRs WR-TB-2006-180 SWB, WR-TB-2007-204, and WR-TB-2006-299
NDA instruments and procedures are appropriate for the waste streams being assayed.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	NDA instruments and procedures are appropriate for the heterogeneous debris wastes currently being assayed.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA),* HNF-26085, Revision 1; SHENCA BDRs WR-TB-2006-180 SWB, WR-TB-2007-204, and WR-TB-2006-299
NDA instruments and procedures result in unbiased values for the cumulative activity of the WIPP radionuclide inventory.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The radioassay values observed in the SHENCA BDRs were acceptable.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA),* HNF-26085, Revision 1; SHENCA BDRs WR-TB-2006-180 SWB, WR-TB-2007-204, and WR-TB-2006-299
Some radionuclides are derived by the application of scaling factors or correlation techniques. Identify all radionuclides that are quantified in this manner.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The SHENCA measures $^{240}Pu_{EFF}$ based on passive neutron emission and calculates other radionuclides based on this value. It can also provide quantitative gamma-based radionuclide values.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA),* HNF-26085, Revision 1
Assess the technical adequacy of the calculations involving the application of scaling factors and/or correlation techniques.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*,	The application of radionuclide scaling factors for ^{242}Pu, ^{234}U and ^{90}Sr is technically adequate.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA),* HNF-26085, Revision 1; WMP-350, Section 2.2, *Calculation of*

ATTACHMENT A.4 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: Super-High Efficiency Neutron Counter A (SHENCA)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
		Appendix E			*Assay Results*, Revision 27
Identify the procedures that govern this function and where the results of these calculations are documented.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The procedure governing the application of radionuclide scaling factors is WMP-350, Section 2.2. Results are documented in the SHENCA BDRs.	Y	WMP-350, Section 2.2, *Calculation of Assay Results*, Revision 27; SHENCA BDRs WR-TB-2006-180 SWB, WR-TB-2007-204, and WR-TB-2006-299
ACCEPTABLE KNOWLEDGE (AK)					
If isotopic ratios based on AK are used the values are qualified by confirmatory testing.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Isotopic ratios are determined using empirical gamma measurements in conjunction with FRAM or default (AK-based) isotopics. Default isotopic values are provided and have been used for approximately 30% of the reported SHENCA assays.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA),* HNF-26085, Revision 1; WMP-350, Section 2.2, *Calculation of Assay Results*, Revision 27
Do NDA personnel use AK derived isotopic values to calculate radionuclide values? If so, is this function performed according to a formal procedure? Assess the technical adequacy of this process(s).	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The application of AK-based isotopics is technically adequate and is performed in accordance with a formal procedure.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA),* HNF-26085, Revision 1; WMP-350, Section 2.2, *Calculation of Assay Results*, Revision 27
Identify the procedure and where the results of these calculations are documented.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	See preceding checklist entry.	Y	See preceding checklist entry.
ISOTOPIC DETERMINATION					
Identify the radionuclides that are measured directly and the specific radiation type (γ, AN or PN) that is measured.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The SHENCA measures $^{240}Pu_{EFF}$ based on passive neutron emission and calculates the contributions of other target radionuclides by application of isotopic distribution values. The SHENCA can also provide gamma-based quantitative radionuclide values.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA),* HNF-26085, Revision 1; WMP-350, Section 2.2, *Calculation of Assay Results*, Revision 27

ATTACHMENT A.4 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: Super-High Efficiency Neutron Counter A (SHENCA)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
Identify the method(s) used to derive the isotopic contribution for the unmeasured radionuclides, e.g., MGA, PC FRAM or other technique.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	FRAM is used with approved AK-based isotopics, as appropriate.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA),* HNF-26085, Revision 1; WMP-350, Section 2.2, *Calculation of Assay Results*, Revision 27

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
LOWER LEVEL OF DETECTION (LLD)					
The LLD for each NDA system must be determined. For multi modal systems this may require a separate determination for each mode, i.e., active neutron, passive neutron and gamma.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	LLD values are provided for both passive neutron and absolute gamma modes.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA),* HNF-26085, Revision 1, Section 4.13, Tables 43 and 44, and summarized in Table 61; WMP-350, Section 2.2, *Calculation of Assay Results*, Revision 27, Tables 7and 8
Site-specific environmental backgrounds and container-specific interferences must be accounted for in LLD determinations.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Site-specific environmental backgrounds and container-specific interferences are taken into account for LLD determinations.	Y	WMP-350, Section 2.2, *Calculation of Assay Results*, Revision 27, Tables 7and 8
NDA instruments performing TRU/Non-TRU waste discrimination measurements are required to have a LLD no greater than 100 nCi/g.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The SHENCA has the required sensitivity to discriminate TRU and non-TRU materials at the 100 nCi/g criterion.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA),* HNF-26085, Revision 1, Section 4.13, Tables 43 and 44, and summarized in Table 61; WMP-350, Section 2.2, *Calculation of Assay Results*, Revision 27, Tables 7and 8

ATTACHMENT A.4 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: Super-High Efficiency Neutron Counter A (SHENCA)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
The technical basis and derivation for LLDs must be adequate and appropriately documented.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The technical bases for both passive neutron and gamma LLDs are technically adequate and are appropriately documented.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA),* HNF-26085, Revision 1, Section 4.13, Tables 43 and 44, and summarized in Table 61
For radionuclides that are not determined primarily by measurement an LLD analog, i.e., a reporting threshold must be used when it is technically feasible. Identify all instances when this occurs and the form of the documentation of these activities.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	LLD values for ^{234}U and ^{90}Sr are derived by application of radionuclide-specific scaling factors to the LLDs for measured values of primary radionuclides, i.e., ^{235}U and ^{238}U for ^{234}U, and ^{137}Cs for ^{90}Sr. LLDs for ^{242}Pu are based on measured Pu values adjusted for the isotopic contribution of ^{242}Pu.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA),* HNF-26085, Revision 1, Section 4.13, Tables 43 and 44, and summarized in Table 61; WMP-350, Section 2.2, *Calculation of Assay Results*, Revision 27, Tables 7and 8
Identify any/all instances where an LLD value for a *non-measured* radionuclide is not provided based on a lack of technical feasibility.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	There are no instances where an LLD value for a *non-measured* radionuclide is not provided based on a lack of technical feasibility.	NA	Not Applicable
Are LLD values container/assay event specific or are typical LLD values applied to a class or type of wastes, i.e., those with similar attributes? If LLD values are not container/assay event specific identify the attributes or characteristics whereby waste containers are grouped.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	SHENCA LLD values container/assay event specific for both passive neutron and absolute gamma operational modes.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA),* HNF-26085, Revision 1, Section 4.13, and Tables 42, 43 and 44

ATTACHMENT A.4 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: Super-High Efficiency Neutron Counter A (SHENCA)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
TOTAL MEASUREMENT UNCERTAINTY (TMU)					
The method used to calculate the TMU for all required quantities must be documented and technically justified.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The SHENCA's TMU is technically justified and appropriately documented.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA),* HNF-26085, Revision 1, Section 4.14. WMP-350, Section 2.2, *Calculation of Assay Results*, Revision 27
TMU determination accounts for all sources of uncertainty, specifically • Random errors • Calibration • Isotopic determination • Matrix inhomogeneity • Difference between calibration assumptions and actual waste • Non uniform source distribution • End effects • Self absorption • Transmission source • Self shielding • Neutron multiplication	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The SHENCA's TMU includes all significant sources of uncertainty. Algorithms for the SuperHENC TMU calculation are in the system's software that is provided by the manufacturer.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA),* HNF-26085, Revision 1; Section 4.14. TMU calculations are addressed in WMP-350, Section 2.2, *Calculation of Assay Results*, Revision 27
Methods to determine TMU must be documented, reviewed and approved by CBFO for each NDA instrument.	NA	Not Applicable	This was not assessed during this inspection.	NA	Not Applicable

ATTACHMENT A.4 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: Super-High Efficiency Neutron Counter A (SHENCA)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
SYSTEM CALIBRATION					
Each NDA instrument must be calibrated before its initial use. Determine the date of the system's calibration of record and where this is documented.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Both operational modes of the SHENCA were calibrated before its initial use, and the dates and technical details of the calibrations are documented in the calibration report.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA).* Revision 1
The range of applicability of the system 's calibration(s) must be specified in site procedures or other formal documentation. Identify the manner in which the range is expressed, i.e., curies or Pu/SNM mass for activity and salient physical characteristics for matrix.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The ranges of applicability of the system 's calibrations for both passive neutron and absolute gamma operational modes are specified in the calibration report. The ranges are expressed in terms of $^{240}Pu_{EFF}$ and AaS for passive neutron and photon energy and net matrix mass for the absolute gamma mode. The SHENCA's passive neutron use is restricted to the coincidence mode, the multiplicity mode is not used for WIPP assays.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA)*, Revision 1, Summarized in Table 61
Any matrix/source surrogate waste combinations must be representative of the activity ranges and relevant waste matrix characteristics currently in use or planned for use by the system. The system must be calibrated to 100% recovery.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The matrix/source surrogate waste combinations used for calibration are representative of the activity ranges and relevant waste matrix characteristics for the heterogeneous debris the SHENCA currently assays. The system is calibrated to 100% recovery.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA)*, Revision 1
The use of consensus standards for calibration is required, when such standards exist. If consensus standards do not exist, the calibration technique must be approved by CBFO.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The SHENCA's calibration is not directly addressed in a consensus standard. The calibration procedure was approved by CBFO, as evidenced by the acceptance of the calibration plan.	Y	HNF-22923, *Calibration and Validation Plan SuperHENC Mobile Assay System*, Revision 0; HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA)*, Revision 1
Identify the specific consensus standards that were used for the system calibration or, in their absence, the alternate calibration technique. Evaluate the CBFO approval of the alternate technique.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The primary and secondary standards are identified in provides the neutron sources used; Table 16 lists the standards used for the calibration confirmation. Appendix 1 provides a complete listing of the sources used.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA)*, Revision 1, Tables 6 and 16 and Appendix I HNF-9787, *WRAP NDA Certified Radioactive Sources,* Revision 0

ATTACHMENT A.4 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: Super-High Efficiency Neutron Counter A (SHENCA)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
Primary standards must be obtained from suppliers maintaining a nationally accredited measurement program. Identify the nationally accredited measurement program.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Primary Pu standards were obtained from the NMT-1 Analytical Chemistry Group of LANL; the gamma sources were obtained from North American Scientific Inc. Both organizations maintain a nationally accredited measurement program	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA)*, Revision 1
List the standards used for calibration and verify the pedigree of each standard.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The primary and secondary standards are identified in HNF-26085, Revision 1, Tables 6 and 16. All radionuclide standards that were used are listed in Appendix I.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA)*, Revision 1, Tables 6 and 16 and Appendix I HNF-9787, *WRAP NDA Certified Radioactive Sources,* Revision 0.
CALIBRATION VERIFICATION & CONFIRMATION					
Verification of an NDA instrument's calibration must be performed after any of the following occurrences: major system repairs and/or modifications, replacement of the system's components, significant changes to the system's software, and relocation of the system.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	There have not been any calibration verifications.	NA	Not Applicable
Recalibration of the system must occur if the calibration verification demonstrates that the system's response has significantly changed.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The SHENCA has not been recalibrated.	NA	Not Applicable
The system calibration must be confirmed by performing replicate measurements of a non-interfering matrix.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The SHENCA's calibration was confirmed using replicate measurements of a non-interfering matrix.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA)*, Revision 1
Replicate measurements must be performed with containers of the same nominal size	Y	HNF-2600, Revision 19, *Hanford Site*	Replicate measurements were performed with SWBs of the same size and according to the same	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System*

ATTACHMENT A.4 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: Super-High Efficiency Neutron Counter A (SHENCA)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
and according to the same procedures used for actual waste assays.		*Transuranic Waste Certification Plan*, Appendix E	operating procedures that are used for actual SHENCA assays of routine TRU waste.		*A (SHENCA)*, Revision 1
Replicate measurements must be performed using nationally recognized standards or standards derived from nationally recognized standards that span the range of use of the instrument with respect to disintegration rate and/or matrix effects. Identify all standards that were used and indicate their application (verification or confirmation).	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Replicate measurements were performed using nationally the appropriate radionuclide standards for passive neutron and absolute gamma modes that span the SHENCA's range of use with respect to disintegration rate and/or matrix effects. The radionuclide standards that were used and their application are listed.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA)*, Revision 1
Identify the nationally accredited measurement program. List the standards used for verification/confirmation and verify the pedigree of each standard.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Primary Pu standards were obtained from the NMT-1 Analytical Chemistry Group of LANL; the gamma sources were obtained from North American Scientific Inc. Both organizations maintain a nationally accredited measurement program	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA)*, Revision 1, Tables 6 and 16 and Appendix I HNF-9787, *WRAP NDA Certified Radioactive Sources,* Revision 0
The standards used for calibration confirmation must not be the same sources as those used for the system's calibration of record.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The standards used for calibration confirmation are different from the sources that were used for the SHENCA' S passive neutron and absolute gamma modes calibrations of record.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA)*, Revision 1
Requirements for accuracy, expressed as %R, and precision, expressed as %RSD, must be met as specified in DOE/WIPP-02-3122, Appendix A, Table A-3.2 for precision and ±30% for accuracy.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The requirements for accuracy and precision for the SHENCA that are specified in DOE/WIPP-02-3122, Appendix A, Table A-3.2 were met for the non-interfering and interfering matrices.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA)*, Revision 1, Tables 25 – 28 for passive neutron and Table 35 for absolute gamma mode

ATTACHMENT A.4 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: Super-High Efficiency Neutron Counter A (SHENCA)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
QUALITY CONTROL					
All radioassay and data validation must be performed by appropriately trained and qualified personnel.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	All personnel performing radioassay and data validation are appropriately trained and qualified.	Y	*People in Classification SUMMARY for WRAP NDA Scientists* provided Monday, June 4, 2007 during inspection.
Identify the name, title and function of all personnel performing NDA data validation.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The name, title and function of all personnel performing NDA data validation have been provided	Y	*People in Classification SUMMARY for WRAP NDA Scientists* provided Monday, June 4, 2007 during inspection.
Requalification of personnel must be based on evidence of continued satisfactory performance and must be performed at least every two years.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Personnel requalification is based on evidence of continued satisfactory performance and is performed at least every two years.	Y	TRU Training Records and TRU Training Database
The site must participate in relevant measurement comparison programs sponsored or approved by CBFO, including the NDA PDP.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The SHENCA successfully completed Cycle B6A of the CBFO sponsored NDA PDP in 2006, participation in Cycle B7A in July 2007.	Y	PDP certification letter from M. Brown, CBFO
BACKGROUND AND PERFORMANCE CHECKS					
Assay system background measurements must be taken daily, unless otherwise approved by CBFO. Determine the form of CBFO approval documentation of the alternate approach to backgrounds, if applicable. Contributions to backgrounds from nearby radiation sources must be carefully controlled, or more frequent backgrounds must be measured.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Background measurements include daily 300-second gamma and 1800-second passive neutron background coincident rate. Contributions to backgrounds from nearby radiation sources have been controlled	Y	WMP-350, Section 2.8,*WRAP NDA Measurement Control Program,* Revision 5; SHENCA BDRs WR-TB-2006-180 SWB, WR-TB-2007-204, and WR-TB-2006-299

ATTACHMENT A.4 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: Super-High Efficiency Neutron Counter A (SHENCA)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
Assess how often background radiation was problematic to the extent that measurement personnel had to make adjustments.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	SHENCA BRDs evaluated do not show evidence of problematic backgrounds.	Y	SHENCA BDRs WR-TB-2006-180 SWB, WR-TB-2007-204, and WR-TB-2006-299
Identify the criteria used to evaluate instrument backgrounds and assess the technical adequacy of this criterion, i.e., statistical or administrative.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	TRU-OP-002 and WMP-350, Section 2.8 requires these daily background measurements. NDA Batch Data Reports include Control Charts documenting these. List of NDA batch reports for SHENCA since 7/1/06.	Y	WMP-350, Section 2.8,*WRAP NDA Measurement Control Program,* Revision 5; SHENCA BDRs WR-TB-2006-180 SWB, WR-TB-2007-204, and WR-TB-2006-299
Identify the number of data points required to derive the initial control limit. At what interval(s) will new limits be calculated?	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The number of data points required to derive the initial control limit and the intervals at which new limits will be calculated are specified.	Y	WMP-350, Section 2.8,*WRAP NDA Measurement Control Program,* Revision 5
System performance checks must be performed at least once per operational day.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	SHENCA BRDs evaluated contain evidence of daily passive neutron and gamma performance checks.	Y	WMP-350, Section 2.8,*WRAP NDA Measurement Control Program,* Revision 5; SHENCA BDRs WR-TB-2006-180 SWB, WR-TB-2007-204, and WR-TB-2006-299
System performance checks must include, as applicable, efficiency, matrix correction checks, and systems peak position and resolution for spectrometric systems.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Neutron performance checks include measuring a $^{240}Pu_{EFF}$ check using a 10 g Pu source and an empty chamber system normalization using the ^{252}Cf source daily. Daily gamma checks include peak position (Energy versus channel) and FWHM (resolution) for the 414 keV ^{239}Pu line.	Y	WMP-350, Section 2.8,*WRAP NDA Measurement Control Program,* Revision 5; SHENCA BDRs WR-TB-2006-180 SWB, WR-TB-2007-204, and WR-TB-2006-299

ATTACHMENT A.4 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: Super-High Efficiency Neutron Counter A (SHENCA)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
At a minimum of once per operational week an interfering matrix must be assayed to assess the long-term stability of the NDA instrument and its matrix corrections and how this performance is documented.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	A heterogeneous debris matrix drum with WG PuO_2 sources is used for weekly interfering matrix checks.	Y	WMP-350, Section 2.8,*WRAP NDA Measurement Control Program,* Revision 5; SHENCA BDRs WR-TB-2006-180 SWB, WR-TB-2007-204, and WR-TB-2006-299
Interfering surrogate waste matrices must be constructed in a way that the salient matrix characteristics do not change over time.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	PDP matrix containers are adequately constructed and durable	Y	Physical inspection of the matrix drums.
The radionuclide sources used for performance checks must be long-lived and of sufficient strength (activity) to provide statistically sufficient results over a short measurement time.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Radionuclide sources used for passive neutron and gamma performance checks are long-lived and of sufficient activity to provide statistically sufficient results over a short counting.	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA)*, Revision 1, Tables 6 and 16 and Appendix I HNF-9787, *WRAP NDA Certified Radioactive Sources,* Revision 0.
Radioactive sources are decay corrected as a function of their physical half life, as appropriate, specifically ^{133}Ba, ^{252}Cf, ^{137}Cs, ^{75}Se and ^{109}Cd.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The 10 g Pu performance check source is long-lived ($T_{1/2} \approx 24{,}000$ years), the ^{252}Cf AaS must be decay corrected	Y	HNF-26085, *Calibration and Validation Report for the WRAP Mobile Assay System A (SHENCA)*, Revision 1, Tables 6 and 16 and Appendix I HNF-9787, *WRAP NDA Certified Radioactive Sources,* Revision 0.
Performance checks must be quantitative and based on 2 and 3 sigma limits.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Measurement control limits are statistically based $\pm 2\sigma$ Warning Limits and $\pm 3\sigma$ Control Limits.	Y	SHENCA BDRsWR-TB-2006-180 SWB, WR-TB-2007-204, and WR-TB-2006-299

ATTACHMENT A.4 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: Super-High Efficiency Neutron Counter A (SHENCA)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
DATA MANAGEMENT					
All radioassay data must be reviewed and approved by qualified personnel before being reported to WWIS.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	All radioassay data has been reviewed and approved by qualified personnel before being reported to WWIS.	Y	Three SHENCA BDRs were reviewed: WR-TB-2006-180 SWB; WR-TB-2007-204; and WR-TB-2006-299
Identify the name, title and function of the individual(s) performing technical review and approval of NDA BRDs.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The name, title and function of the individuals performing technical review and approval of NDA BRDs were provided.	Y	*People in Classification SUMMARY for WRAP NDA Scientists* provided Monday, June 4, 2007 during inspection.
Radioassay BDRs must consist of the following elements: • Testing facility name, testing batch number, container numbers, and signature of the Site Project Officer (SPO) or designee(s) • Table of Contents • Background and performance check data or control charts for the relevant time period. • Data validation per the QAPD and site procedures • Separate testing report sheets for each container.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	SHENCA BDRs reviewed during the inspection included: • Testing facility name, batch number, container numbers, and signature of the Hanford Site Project Officer • Table of Contents • Background, performance check data and control charts • Data validation per HNF-2600, Revision 13 • Separate testing report sheets for each container.	Y	SHENCA BDRs WR-TB-2006-180 SWB, WR-TB-2007-204, and WR-TB-2006-299
Radioassay data sheets must include: • Title "Radioassay Data Sheet" • Method/procedure used • Date of radioassay	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Testing report sheets include: • Title "Radioassay Data Sheet" • Method/procedure used • Date of radioassay	Y	Three SHENCA BDRs were reviewed: WR-TB-2006-180 SWB containing SWBs 0021646, 0028170 & 0028202; WR-TB-2007-204 containing SWBs 0028654, 0028656, 0028657, 0028661, 0028664; and WR-TB-2006-299containing

ATTACHMENT A.4 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: Super-High Efficiency Neutron Counter A (SHENCA)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
• Activities and associated TMU for individual radionuclides • TRU alpha concentration and its associated TMU • Operator signature • Reviewer signature			• Activities and associated TMU for individual radionuclides • TRU alpha concentration and its associated TMU • Operator signature • Reviewer signature		SWBs 0023107, 023111, 023168, 0023728, 0023742, 0028186, 0028650, 0028652
The following nonpermanent records must be maintained at the radioassay-testing facility or forwarded to the site project office: • Testing batch reports • All raw data, including instrument readouts, calculation records, and radioassay QC results • All applicable instrument calibration reports	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	SHENCA data are backed up with the BRDs on compact discs. Validated BDRs are retained in the Hanford TRU Records Center.	Y	Discussions with N. Abdurrahman and observation of records in the SHENCA trailer.

ATTACHMENT A.5 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST - CALORIMETRY

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: PFP Calorimeters AR-1, AR-5, P-13, P-14 & Q-1; Room 172 SGSAS

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
SYSTEM DESCRIPTION					
Identify the NDA systems by name, location and number, as appropriate.	NA	General system information	Calorimeters AR-1, AR-5, Q-1, P-13 and P-14 and the Room 172 Segmented Gamma Scanner Assay System (SGSAS) are located in Room 172 of the Plutonium Finishing Plant (PFP) at Hanford.	NA	Physical observation of the calorimeters and SGSAS units
Describe each system's operational history at this site and deployment at other DOE sites.	NA	General system information	These calorimeters and the Room 172 SGSAS have been operational in the same location within PFP since at least 2002. Some of the calorimeters used previously at RFETS to perform WIPP assays.	NA	Previous EPA inspections that included these systems.
Describe each assay system's operational components.	NA	General system information	All three calorimeters are ANTECH R-Series Air-Bath Calorimeters that have the capacity to accept samples with maximum dimensions of 190mm (7.48 inches) diameter and 356 mm (14.02 inches) high. Typical samples are billet and pewter cans that measure approximately 138 mm in diameter and 177.5 mm high. The calorimeters are used in conjunction with the Room 172 SGSAS that determines each sample's isotopics based on a gamma assay. The calorimeter systems are essentially equivalent but each has a specific calibration.	NA	Observation of these systems in use within PFP during inspection.
For systems that have been deployed at multiple DOE sites document the pertinent aspects of each system's development, e.g., installation of new or different detectors, software or other relevant features.	NA	General scoping information	In addition to WIPP assays, the calorimeters may continue to be used for Safeguards assays where the operational range is typically higher (0.0 – 1.2 Watts). The WIPP range is a subset of the larger Safeguards range. Some of the calorimeters used previously at RFETS were transferred to the PFP as operations at RFETS were terminated.	NA	Discussion with M. Cameron and G. Westik during inspection and evaluation of Calorimetry BDRs cited in the next checklist.

ATTACHMENT A.5 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST - CALORIMETRY

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: PFP Calorimeters AR-1, AR-5, P-13, P-14 & Q-1; Room 172 SGSAS

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
SYSTEM PERFORMANCE					
Identify the period of performance relevant to this inspection and if these NDA systems have prior EPA approval(s).	NA	General scoping information	This is the baseline approval of these systems. All calorimeters and the Room 172 SGSAS had been approved previously.	Y	Discussion with M. Cameron and G. Westik during inspection and evaluation of Calorimetry BDRs cited in the next checklist.
Identify the number of waste containers these systems assayed during the period of performance. Of these, indicate how many Batch Data Reports (BDRs) were assembled. Of the assembled BDRs, indicate how many have been promoted through Project Level Review and are available for evaluation during this inspection.	NA	General scoping information	19 different items were assayed over the past year and these have been assembled into five Batch Data Reports (BDRs).	Y	PFP-TB-2006-053-P14; PFP-TB-2006-054-P14; PFP-TB-2006-061-AR1; PFP-TB-2006-062-AR1; PFP-TB-2006-069-P13

ATTACHMENT A.5 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST - CALORIMETRY

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: PFP Calorimeters AR-1, AR-5, P-13, P-14 & Q-1; Room 172 SGSAS

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
GENERAL REPORTING REQUIREMENTS					
Assay systems must report quantitative values and uncertainties for ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{241}Am, ^{233}U, ^{234}U, ^{238}U, ^{90}Sr, and ^{137}Cs.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Quantitative values and uncertainties for ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{241}Am, ^{233}U, ^{234}U, ^{238}U, ^{90}Sr, and ^{137}Cs are reported.	Y	Calibration Reports: AR1: HNF-14135 Revision 2 (1/20/04); AR5: HNF-14449 Revision 1 (11/19/03); P13: HNF-15785 Revision 0 (6/2/03); P14: HNF-15788 Revision 0 (6/12/03); Q1: HNF-15794 Revision 0 (6/30/03); SGSAS: HNF-14035 Revision 1 (10/18/04)
Each container characterized and intended for disposal at WIPP must contain TRU waste.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Containers assayed on the calorimeters meet the definition of TRU waste, i.e., contain greater than 100 nCi/g of TRU alpha activity	Y	Calorimetry BDRs: PFP-TB-2006-053-P14; PFP-TB-2006-054-P14; PFP-TB-2006-061-AR1; PFP-TB-2006-062-AR1; PFP-TB-2006-069-P13
NDA instruments and procedures are appropriate for the waste streams being assayed.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The calorimeters and SGSAS and their supporting procedures are appropriate for the TRU wastes they currently assay.	Y	FSP-PFP-5-8, Section 16.2, Revision 13, Change 0 (03/12/07), *Data Management;* FSP-PFP-5-8, Section 16.3, Revision 2, Change 0 (01/13/04), *QC Criteria for Residues Project NDA Instrument;* FSP-PFP-5-8, Section 16.4, Revision 3, Change 0 (03/24/05), *Calibration Confirmation for Residues Project NDA Instruments;* ZA-400-302, Revision E, Change 0 (06/27/06), *Calculation of Assay Results;* ZA-400-303, Revision A, Change 0 (02/10/03), *Energy and Efficiency Setup and Baseline Determination Using NDA 2000;* ZA-400-304, Revision A, Change 2 (05/30/06), *ANTECH Calorimeter Calibration;* ZA-948-392, Revision A, Change 7 (02/13/06), *NDA Using the NDA 2000 (Room 172 SGSAS) 2nd SGSAS;* ZA-948-393, Revision B, Change 4 (09/16/05), *NDA Using the Room 172 ANTECH Calorimeters*

Revision No.: 2.0
Date of Revision: 5-15-07

ATTACHMENT A.5 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST - CALORIMETRY

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: PFP Calorimeters AR-1, AR-5, P-13, P-14 & Q-1; Room 172 SGSAS

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
NDA instruments and procedures result in unbiased values for the cumulative activity of the WIPP radionuclide inventory.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The radioassay values observed in the BDRs were acceptable	Y	Calibration Reports: AR1: HNF-14135 Revision 2 (1/20/04); AR5: HNF-14449 Revision 1 (11/19/03); P13: HNF-15785 Revision 0 (6/2/03); P14: HNF-15788 Revision 0 (6/12/03); Q1: HNF-15794 Revision 0 (6/30/03); SGSAS: HNF-14035 Revision 1 (10/18/04)
Some radionuclides are derived by the application of scaling factors or correlation techniques. Identify all radionuclides that are quantified in this manner.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The 10 WIPP-tracked isotopes are accounted for by measurement with the following exceptions: ^{90}Sr is scaled to the measured ^{137}Cs value; ^{234}U is scaled to the measured ^{235}U or ^{238}U values; ^{242}Pu is measured indirectly based on the specific mix of other Pu isotopes. Default isotopics are not used, Pu isotopic types range from WG to fuel grade.	Y	ZA-400-302, Revision E, Change 0 (06/27/06), *Calculation of Assay Results*
Assess the technical adequacy of the calculations involving the application of scaling factors and/or correlation techniques.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The calculations involving the application of scaling factors are technically adequate.	Y	ZA-400-302, Revision E, Change 0 (06/27/06), *Calculation of Assay Results*
Identify the procedures that govern this function and where the results of these calculations are documented.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The procedures that govern this function and the location of their results are documented.	Y	ZA-400-302, Revision E, Change 0 (06/27/06), *Calculation of Assay Results*

ATTACHMENT A.5 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST - CALORIMETRY

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: PFP Calorimeters AR-1, AR-5, P-13, P-14 & Q-1; Room 172 SGSAS

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
ACCEPTABLE KNOWLEDGE (AK)					
If isotopic ratios based on AK are used the values are qualified by confirmatory testing.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	All containers are assayed for isotopics using the Room 172 SGSAS.	Y	Calibration Report for SGSAS: HNF-14035 Revision 1 (10/18/04)
Do NDA personnel use AK derived isotopic values to calculate radionuclide values? If so, is this function performed according to a formal procedure? Assess the technical adequacy of this process(s).	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The 10 WIPP-tracked isotopes are accounted for by measurement with the exceptions noted above. Default isotopics are not used, isotopic types range from WG to fuel grade.	Y	Calibration Report for SGSAS: HNF-14035 Revision 1 (10/18/04)
Identify the procedure and where the results of these calculations are documented.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	See checklist item in column to the right.	Y	ZA-400-302, Revision E, Change 0 (06/27/06), *Calculation of Assay Results*
ISOTOPIC DETERMINATION					
Identify the approved assay modes for each calorimeter: Endpoint, Prediction and/or Equilibrium.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Approved assay modes are as follows: AR-1 — Endpoint and Prediction; P-13 — Endpoint, Prediction and Equilibrium; P-14 — Endpoint and Equilibrium	Y	FSP-PFP-5-8, Section 16.2, Revision 13, Change 0 (03/12/07), *Data Management;* FSP-PFP-5-8, Section 16.3, Revision 2, Change 0 (01/13/04); *QC Criteria for Residues Project NDA Instrument;* FSP-PFP-5-8, Section 16.4, Revision 3, Change 0 (03/24/05); *Calibration Confirmation for Residues Project NDA Instruments;* ZA-400-302, Revision E, Change 0 (06/27/06); *Calculation and Review of Assay Results;* ZA-400-303, Revision A, Change 0 (02/10/03); *Energy and Efficiency Setup and Baseline Determination Using NDA 2000;* ZA-400-304, Revision A, Change 2 (05/30/06);

ATTACHMENT A.5 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST - CALORIMETRY

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: PFP Calorimeters AR-1, AR-5, P-13, P-14 & Q-1; Room 172 SGSAS

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
					ANTECH Calorimeter Calibration, ZA-948-392, Revision A, Change 7 (02/13/06); *NDA Using the NDA 2000 (Room 172 SGSAS) 2nd SGSAS;* ZA-948-393, Revision B, Change 4 (09/16/05); *NDA Using the Room 172 ANTECH Calorimeters*
Identify the method(s) used to derive the isotopic contribution for the unmeasured radionuclides, e.g., MGA, PC FRAM or other technique.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The Canberra Room 172 SGSAS determines each sample's isotopics based on a direct gamma assay and data reduction with Multi Group Analysis (MGA).	Y	*NDA Using the NDA 2000 (Room 172 SGSAS) 2nd SGSAS;* ZA-948-393, Revision B, Change 4 (09/16/05)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
LOWER LEVEL OF DETECTION (LLD)					
The LLD for each NDA system must be determined. For multi modal systems this may require a separate determination for each mode, i.e., active neutron, passive neutron and gamma.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The LLD for all calorimeters must be determined. For multi modal systems this may require a separate determination for each mode, i.e., active neutron, passive neutron and gamma.	Y	HNF-14038, Revision 2 (7/7/03), *LLD Determination for PFP Residues Using the ANTECH Calorimeters*
Site-specific environmental backgrounds and container-specific interferences must be accounted for in LLD determinations.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Not applicable to calorimetry. SGSAS determinations adequately account for the ambient gamma background.	Y	HNF-14038, Revision 2 (7/7/03), *LLD Determination for PFP Residues Using the ANTECH Calorimeters*
NDA instruments performing TRU/Non-TRU waste discrimination measurements are required to have a LLD no greater than 100 nCi/g.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The calibrated range of the calorimeters is approximately 10 g to 190 g Pu Total, which, when combined with the sample container's volume, means that any sample within this range would contain greater than 100 nCi/g. These	Y	HNF-14038, Revision 2 (7/7/03), *LLD Determination for PFP Residues Using the ANTECH Calorimeters*

ATTACHMENT A.5 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST - CALORIMETRY

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: PFP Calorimeters AR-1, AR-5, P-13, P-14 & Q-1; Room 172 SGSAS

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
			calorimeters cannot be used to discriminate TRU/Non TRU.		
The technical basis and derivation for LLDs must be adequate and appropriately documented.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The technical basis and derivation for LLDs were presented and discussed at length with M. Cameron, G. Westik and B. Gillespie. The LLDs for these systems are adequate	Y	HNF-14038, Revision 2 (7/7/03), *LLD Determination for PFP Residues Using the ANTECH Calorimeters*; clarifying memorandum from M. Cameron to P. Kelly following on-site inspection
For radionuclides that are not determined primarily by measurement an LLD analog, i.e., a reporting threshold must be used when it is technically feasible. Identify all instances when this occurs and the form of the documentation of these activities.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The ^{90}Sr LLD is scaled from the ^{137}Cs LLD, which is a function of the observed ^{241}Am/ ^{137}Cs ratio. The ^{234}U LLD is calculated from the activity ratios of ^{235}U and ^{238}U.	Y	HNF-14038, Revision 2 (7/7/03), *LLD Determination for PFP Residues Using the ANTECH Calorimeters*
Identify any/all instances where an LLD value for a *non-measured* radionuclide is not provided based on a lack of technical feasibility.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	There are no instances where an LLD value for a *non-measured* radionuclide is not provided based on a lack of technical feasibility.	NA	Not Applicable
Are LLD values container/assay event specific or are typical LLD values applied to a class or type of wastes, i.e., those with similar attributes? If LLD values are not container/assay event specific identify the attributes or characteristics whereby waste containers are grouped.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	LLD values are container and assay event specific.	Y	HNF-14038 Revision 2 (7/7/03); Calorimetry BDRs: PFP-TB-2006-053-P14; PFP-TB-2006-054-P14; PFP-TB-2006-061-AR1; PFP-TB-2006-062-AR1; PFP-TB-2006-069-P13

ATTACHMENT A.5 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST - CALORIMETRY

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: PFP Calorimeters AR-1, AR-5, P-13, P-14 & Q-1; Room 172 SGSAS

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
TOTAL MEASUREMENT UNCERTAINTY (TMU)					
The method used to calculate the TMU for all required quantities must be documented and technically justified.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The TMU values for the calorimeters and the SGSAS unit are technically justified and appropriately documented.	Y	TMU Report HNF-15103 Revision 3, (11/19/03)
TMU determination accounts for all sources of uncertainty, specifically • Random errors • Calibration • Isotopic determination • Matrix inhomogeneity • Difference between calibration assumptions and actual waste • Non uniform source distribution • End effects • Self absorption • Transmission source • Self shielding • Neutron multiplication	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The TMU values for the calorimeters and the SGSAS unit accounts for all relevant sources of uncertainty.	Y	TMU Report HNF-15103 Revision 3, (11/19/03)
Methods to determine TMU must be documented, reviewed and approved by CBFO for each NDA instrument.	NA	Not Applicable	This was not assessed during this inspection.	NA	Not Applicable

ATTACHMENT A.5 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST - CALORIMETRY

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: PFP Calorimeters AR-1, AR-5, P-13, P-14 & Q-1; Room 172 SGSAS

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
SYSTEM CALIBRATION					
Each NDA instrument must be calibrated before its initial use. Determine the date of the system's calibration of record and where this is documented.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	All calorimeters and the Room 172 SGSAS were calibrated before their initial use. The calibration of record for each of the calorimeter is documented.	Y	Calorimeter Calibration Reports: AR1: HNF-14135 Revision 2 (1/20/04) AR5: HNF-14449 Revision 1 (11/19/03) P13: HNF-15785 Revision 0 (6/2/03) P14: HNF-15788 Revision 0 (6/12/03) Q1: HNF-15794 Revision 0 (6/30/03) SGSAS: HNF-14035 Revision 1 (10/18/04)
The range of applicability of the system 's calibration(s) must be specified in site procedures or other formal documentation. Identify the manner in which the range is expressed, i.e., curies or Pu/SNM mass for activity and salient physical characteristics for matrix.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Calorimetric measurements are not radiometric. The quantity they measure is heat generated by nuclear transitions of the sample's radioactive material (Pu) as opposed to nuclear transitions themselves. Operating ranges are typically expressed in Watts, which are converted to mass (grams of Pu) assuming 0.0025 Watts/gram WG Pu. The calibrated range of the calorimeters is approximately 10 g to 190 g Pu Total.	Y	Calorimeter Calibration Reports: AR1: HNF-14135 Revision 2 (1/20/04) AR5: HNF-14449 Revision 1 (11/19/03) P13: HNF-15785 Revision 0 (6/2/03) P14: HNF-15788 Revision 0 (6/12/03) Q1: HNF-15794 Revision 0 (6/30/03) SGSAS: HNF-14035 Revision 1 (10/18/04)
Any matrix/source surrogate waste combinations must be representative of the activity ranges and relevant waste matrix characteristics currently in use or planned for use by the system. The system must be calibrated to 100% recovery.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Matrix effects are not applicable to calorimetry.	NA	Not Applicable

ATTACHMENT A.5 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST - CALORIMETRY

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: PFP Calorimeters AR-1, AR-5, P-13, P-14 & Q-1; Room 172 SGSAS

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
The use of consensus standards for calibration is required, when such standards exist. If consensus standards do not exist, the calibration technique must be approved by CBFO.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Consensus standards are cited in the certification plan but not in the individual calorimeters' operating procedures and calibration reports. See next checklist entry.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E
Identify the specific consensus standards that were used for the system calibration or, in their absence, the alternate calibration technique. Evaluate the CBFO approval of the alternate technique.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The following consensus standards are cited: ANSI N15.54; ASTM C1030-95; ASTM C1458-00; ANSI N15.36-1994; and, ANSI N15.22-1987. All are appropriate for calorimetry with a gamma-based isotopic determination.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E
Primary standards must be obtained from suppliers maintaining a nationally accredited measurement program. Identify the nationally accredited measurement program.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Primary standards used for calibration, and calibration confirmation and verification were obtained from suppliers maintaining a nationally accredited measurement program.	Y	Calorimeter calibration reports cited previously in this checklist; HBF-9787, *WRAP NDA Certified Radioactive Sources*, Revision 0
List the standards used for calibration and verify the pedigree of each standard.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Calibration Standards are electrical, i.e., NIST-traceable resistor plates and DVM with a NIST-traceable calibration. Confirmation Standards were NTP Pu standards. Verification Standards are NIST-correlated ash standards, described in HNF-17453	Y	Calorimeter calibration reports cited previously in this checklist; HBF-9787, *WRAP NDA Certified Radioactive Sources*, Revision 0
CALIBRATION VERIFICATION & CONFIRMATION					
Verification of an NDA instrument's calibration must be performed after any of the following occurrences: major system repairs and/or modifications, replacement of the system's components, significant changes to the system's software, and	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Two calibration verifications were performed: one for AR5 on October 10, 2006 and one for P13 on December 8, 2006. Both were technically adequate and appropriately documented.	Y	AR5 – AR5 Calibration Verification, October 10, 2006; P13 – P-13 Calibration Verification – December 8, 2006

ATTACHMENT A.5 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST - CALORIMETRY

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: PFP Calorimeters AR-1, AR-5, P-13, P-14 & Q-1; Room 172 SGSAS

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
relocation of the system.					
Recalibration of the system must occur if the calibration verification demonstrates that the system's response has significantly changed.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	These systems have not been recalibrated.	NA	Not Applicable
The system calibration must be confirmed by performing replicate measurements of a non-interfering matrix.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Not applicable. Not required for calorimeters since they are matrix independent	Y	Not Applicable
Replicate measurements must be performed with containers of the same nominal size and according to the same procedures used for actual waste assays.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Not applicable. Not required for calorimeters since they are matrix independent	Y	Not Applicable
Replicate measurements must be performed using nationally recognized standards or standards derived from nationally recognized standards that span the range of use of the instrument with respect to disintegration rate and/or matrix effects. Identify all standards that were used and indicate their application (verification or confirmation).	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Calorimeters are calibrated using electrical and/or heat standards.	Y	Calorimeter Calibration Reports: AR1: HNF-14135 Revision 2 (1/20/04) AR5: HNF-14449 Revision 1 (11/19/03) P13: HNF-15785 Revision 0 (6/2/03) P14: HNF-15788 Revision 0 (6/12/03) Q1: HNF-15794 Revision 0 (6/30/03) SGSAS: HNF-14035 Revision 1 (10/18/04)
Identify the nationally accredited measurement program. List the standards used for verification/confirmation and verify	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*,	Calibration standards are electrical, NIST-traceable resistor plates and DVM with a NIST-traceable calibration. Calibration confirmation standards are NTP Pu standards. Calibration verification	Y	Calorimeter Calibration Reports: AR1: HNF-14135 Revision 2 (1/20/04) AR5: HNF-14449 Revision 1 (11/19/03)

ATTACHMENT A.5 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST - CALORIMETRY

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: PFP Calorimeters AR-1, AR-5, P-13, P-14 & Q-1; Room 172 SGSAS

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
the pedigree of each standard.		Appendix E	standards are NIST-correlated ash standards, described in HNF-17453.		P13: HNF-15785 Revision 0 (6/2/03) P14: HNF-15788 Revision 0 (6/12/03) Q1: HNF-15794 Revision 0 (6/30/03) SGSAS: HNF-14035 Revision 1 (10/18/04)
The standards used for calibration confirmation must not be the same sources as those used for the system's calibration of record.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	See preceding checklist entry.	Y	See calibration reports listed in preceding checklist entry.
Requirements for accuracy, expressed as %R, and precision, expressed as %RSD, must be met as specified in DOE/WIPP-02-3122, Appendix A, Table A-3.2 for precision and ±30% for accuracy.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Requirements for accuracy and precision were met for the calibration of all calorimeters and the Room 172 SGSAS.	Y	ZA-400-303, Revision A, Change 0 (02/10/03), *Energy and Efficiency Setup and Baseline Determination Using NDA 2000*; ZA-400-304, Revision A, Change 2 (05/30/06), *ANTECH Calorimeter Calibration*

ATTACHMENT A.5 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST - CALORIMETRY

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: PFP Calorimeters AR-1, AR-5, P-13, P-14 & Q-1; Room 172 SGSAS

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
QUALITY CONTROL					
All radioassay and data validation must be performed by appropriately trained and qualified personnel.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	All calorimetry data validation is performed by appropriately trained and qualified PFP personnel	Y	Calorimetry BDRs: PFP-TB-2006-053-P14; PFP-TB-2006-054-P14; PFP-TB-2006-061-AR1; PFP-TB-2006-062-AR1; PFP-TB-2006-069-P13
Identify the name, title and function of all personnel performing NDA data validation.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The name, title and function of all personnel performing NDA data validation were provided.	Y	*People in Classification SUMMARY*, Monday, June 4, 2007 provided during the inspection
Requalification of personnel must be based on evidence of continued satisfactory performance and must be performed at least every two years.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Requalification of personnel is based on evidence of continued satisfactory performance and is performed at least every two years.	Y	*People in Classification SUMMARY*, Monday, June 4, 2007 provided during the inspection; TRU Training Tracking System
The site must participate in relevant measurement comparison programs sponsored or approved by CBFO, including the NDA PDP.	NA	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	There is no measurement comparison program for small containers	NA	Not Applicable
BASELINE AND PERFORMANCE CHECKS					
Calorimeter baselines/basepower measurements are taken at a frequency that is technically appropriate and is specified in Hanford operating procedures.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The frequency of basepower measurements is stated and is technically appropriate.	Y	ZA-948-392, Revision A, Change 7 (02/13/06), *NDA Using the NDA 2000 (Room 172 SGSAS) 2nd SGSAS*; ZA-948-393, Revision B, Change 4 (09/16/05), *NDA Using the Room 172 ANTECH Calorimeters*
Assess how often background radiation was problematic to the extent that measurement personnel had to make adjustments.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Background radiation is not applicable to calorimeters but is relevant to the SGSAS. Background measurements are performed and recorded weekly.	Y	Calorimetry BDRs: PFP-TB-2006-053-P14; PFP-TB-2006-054-P14; PFP-TB-2006-061-AR1; PFP-TB-2006-062-AR1; PFP-TB-2006-069-P13

ATTACHMENT A.5 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST - CALORIMETRY

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: PFP Calorimeters AR-1, AR-5, P-13, P-14 & Q-1; Room 172 SGSAS

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
Identify the criteria used to evaluate instrument baselines and assess the technical adequacy of this criterion, i.e., statistical or administrative.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The criteria used to evaluate the calorimeters baselines are technically adequate and appropriately documented.	Y	Calorimeter Calibration Reports: AR1: HNF-14135 Revision 2 (1/20/04) AR5: HNF-14449 Revision 1 (11/19/03) P13: HNF-15785 Revision 0 (6/2/03) P14: HNF-15788 Revision 0 (6/12/03) Q1: HNF-15794 Revision 0 (6/30/03) SGSAS: HNF-14035 Revision 1 (10/18/04)
Identify the number of data points required to derive the initial control limit. At what interval(s) will new limits be calculated?	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	A minimum of 10 data points is required to establish the initial control limit for base power and wattage. Limits are reviewed after the collection of another 10 data points and may be revised as necessary.	Y	FSP-PFP-5-8, Section 16.3, Change 0 (01/13/04), *QC Criteria for Residues Project NDA Instruments,* Revision 2; ZA-400-302, Revision E, Change 0 (06/27/06); *Calculation and Review of Assay Results*
System performance checks must be performed at least once per operational day.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Performance checks for the SGSAS are performed daily. Calorimetry checks are performed weekly.	Y	FSP-PFP-5-8, Section 16.3, Change 0 (01/13/04), *QC Criteria for Residues Project NDA Instruments,* Revision 2; ZA-400-302, Revision E, Change 0 (06/27/06), *Calculation and Review of Assay Results*
System performance checks must include, as applicable, efficiency, matrix correction checks, and systems peak position and resolution for spectrometric systems.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Calorimetry checks incorporate base power measurements. The SGSAS uses energy and resolution (FWHM) checks.	Y	ZA-400-302, Revision E, Change 0 (06/27/06); *Calculation and Review of Assay Results*
At a minimum of once per operational week an interfering matrix must be assayed to assess the long-term stability of the NDA instrument and its matrix corrections and how this performance is	NA	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Weekly interfering matrix checks are not applicable to calorimetry.	NA	Not Applicable

ATTACHMENT A.5 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST - CALORIMETRY

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: PFP Calorimeters AR-1, AR-5, P-13, P-14 & Q-1; Room 172 SGSAS

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
documented.					
Interfering surrogate waste matrices must be constructed in a way that the salient matrix characteristics do not change over time.	NA	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Weekly interfering matrix checks are not applicable to calorimetry.	NA	Not Applicable
The radionuclide sources used for performance checks must be long-lived and of sufficient strength (activity) to provide statistically sufficient results over a short measurement time.	NA	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Not Applicable	NA	Not Applicable
Radioactive sources are decay corrected as a function of their physical half life, as appropriate, specifically ^{133}Ba, ^{252}Cf, ^{137}Cs, ^{75}Se and ^{109}Cd.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Calibration standards are electrical, NIST-traceable resistor plates and Digital Volt Meter (DVM) with a NIST-traceable calibration; decay correction is not applicable to these standards.	Y	Calorimeter Calibration Reports: AR1: HNF-14135 Revision 2 (1/20/04) AR5: HNF-14449 Revision 1 (11/19/03) P13: HNF-15785 Revision 0 (6/2/03) P14: HNF-15788 Revision 0 (6/12/03) Q1: HNF-15794 Revision 0 (6/30/03) SGSAS: HNF-14035 Revision 1 (10/18/04)
Performance checks must be quantitative and based on 2 and 3 sigma limits.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Calorimetry BDRs reviewed provided evidence of successful performance checks, as required	Y	Calorimetry BDRs: PFP-TB-2006-053-P14; PFP-TB-2006-054-P14; PFP-TB-2006-061-AR1; PFP-TB-2006-062-AR1; PFP-TB-2006-069-P13

ATTACHMENT A.5 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST - CALORIMETRY

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: PFP Calorimeters AR-1, AR-5, P-13, P-14 & Q-1; Room 172 SGSAS

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
DATA MANAGEMENT					
All radioassay data must be reviewed and approved by qualified personnel before being reported to WWIS.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	All radioassay data has been reviewed and approved by qualified personnel before being reported to WWIS.	Y	Calorimetry BDRs: PFP-TB-2006-053-P14; PFP-TB-2006-054-P14; PFP-TB-2006-061-AR1; PFP-TB-2006-062-AR1; PFP-TB-2006-069-P13
Identify the name, title and function of the individual(s) performing technical review and approval of NDA BRDs.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The name, title and function of the individuals performing technical review and approval of NDA BRDs were provided.	Y	Discussions with M. Cameron and E. Greager and observation of PFP records
Radioassay BDRs must consist of the following elements: • Testing facility name, testing batch number, container numbers, and signature of the Site Project Officer (SPO) or designee(s) • Table of Contents • Background and performance check data or control charts for the relevant time period. • Data validation per the QAPD and site procedures • Separate testing report sheets for each container.	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	The calorimetry BDRs reviewed during the inspection included all required elements	Y	Calorimetry BDRs: PFP-TB-2006-053-P14; PFP-TB-2006-054-P14; PFP-TB-2006-061-AR1; PFP-TB-2006-062-AR1; PFP-TB-2006-069-P13
Radioassay data sheets must include: • Title "Radioassay Data Sheet" • Method/procedure used	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Calorimetry report sheets included all required elements.	Y	Individual radioassay data sheets from the following BDRs: PFP-TB-2006-053-P14; PFP-TB-2006-054-P14; PFP-TB-2006-061-AR1; PFP-TB-2006-062-AR1; PFP-TB-2006-069-P13

ATTACHMENT A.5 NONDESTRUCTIVE ASSAY (NDA) CHECKLIST - CALORIMETRY

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 4 – 7, 2007
NDA System: PFP Calorimeters AR-1, AR-5, P-13, P-14 & Q-1; Room 172 SGSAS

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
• Date of radioassay • Activities and associated TMU for individual radionuclides • TRU alpha concentration and its associated TMU • Operator signature • Reviewer signature					
The following nonpermanent records must be maintained at the radioassay-testing facility or forwarded to the site project office: • Testing batch reports • All raw data, including instrument readouts, calculation records, and radioassay QC results • All applicable instrument calibration reports	Y	HNF-2600, Revision 19, *Hanford Site Transuranic Waste Certification Plan*, Appendix E	Calorimetry data are backed up with the BRDs on compact discs. Validated BDRs are retained in the Hanford TRU Records Center.	Y	Discussions with M. Cameron, E. Greager and G. Westik during the inspection and observation of records

ATTACHMENT A.6 REAL-TIME RADIOGRAPHY (RTR) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 04-07, 2007
DRUM AND SWB REAL-TIME RADIOGRAPHY (WRAP)

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/ Comment
RTR-1: Site procedures identify required training and qualifications for RTR personnel	Y WMP-400, R 20, s. 1.2.2, 2.1.1 #6, s. 4.6	• Operator training was consistent with applicable procedures • Operator certification is current • OJT was documented for each operator • Operators are re-qualified every two years • RTR operators passed a training drum test that includes items common to the waste streams examined at the site (biannually) • RTR operators receive training on the waste matrix parameters and typical packaging configurations expected in each waste stream	Y	EPA reviewed both the written and audio/visual records of RTR operator capability demonstration. To qualify as an SWB RTR operator, the candidates must first become qualified as a drum RTR operator. The pool of qualified RTR operators includes individuals with a large number of years of experience of this type of examination. The training records reviewed were complete and contained evidence that the operators had completed all of the required initial and continuing training and testing: • TRU program course 300921B • Satisfies requirements of COGEMA-SVCP-PRC-014 • Completes AREVA/COGEMA exam >80% • Capability demonstration • Training container every 6 months • Re-qualification every 2 years • Required reading Hanford was unable to provide EPA with a complete inventory for either the training drum or the training SBW. EPA generated concern HAN-06-RTR-006CR to address this issue. HAN-06-RTR-006CR: All the contents of the SWB that is used for the biannual capability demonstration for RTR operators are not documented. The SWB does contain items required by Appendix A of WMP-400, Section 1.2, R.20 and those requested by the site from work order W1-07-00182/0 but the remaining items in the SWB are unknown.

ATTACHMENT A.6 REAL-TIME RADIOGRAPHY (RTR) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 04-07, 2007
DRUM AND SWB REAL-TIME RADIOGRAPHY (WRAP)

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/ Comment
				Without a comprehensive listing of the SWB's contents EPA was unable to verify that the RTR operators had identified all of the CPR items in the training container. The same situation exists for the RTR Training Drum No. 9903393. Objective evidence: 1. Radiography Data Sheet for capability demonstration SWB for an operator, dated 5/3/07 2. Biannual Training Results for Non-Destructive Examination, NDE Supervisor Review/Findings report, dated 1/22/07 3. Audio/visual recording of drum RTR capability demonstration for operator, dated 1/4/07 4. Audio/visual recording of SWB RTR capability demonstration for operator, dated 5/7/07 5. Partial inventory for training SWB and drum
RTR-2: Site procedure(s) provide complete instructions for operators to perform the RTR examination and completion of the associated documentation	Y WRP1-OP-0908, R. I, Change 9 WRP1-OP-0909, R. E, Change 0	RTR operator adequately explained the process followed for examining a drum/SWB entering data into data forms (whether hard copy or electronic data entry is used).	Y	EPA observed the RTR examination of drum 039934 (batch WR-TB-2007-127) and SWB 0013133 (batch WR-TB-2007-093) The operators were able to explain and demonstrate how RTR data are entered into the electronic data sheets and how WMP weights are estimated. The procedures used contain complete instructions for performing RTR examinations and recording data. The procedures were implemented as written. Objective evidence: 1. RTR Batch Data Report for SWB: WR-TB-2007-091, WR-TB-2007-093 (S5000, debris waste)

ATTACHMENT A.6 REAL-TIME RADIOGRAPHY (RTR) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 04-07, 2007
DRUM AND SWB REAL-TIME RADIOGRAPHY (WRAP)

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/ Comment
				2. RTR Batch Data Report for drums: WR-TB-2007-060, WR-TB-2007-069, WR-TB-2004-297, WR-TB-2005-177 (S5000, debris waste) 3. RTR Batch Data Report for drums: WR-TB-2007-089, WR-TB-2007-098 (S3000, solid waste)
RTR-3: The RTR procedure(s) require an image quality check to be performed.	Y WRP1-OP-0908, R. I, Change 9, s. 5.2, 5.3 WRP1-OP-0909, R. E, Change 0, s. 5.3	• Operator adequately explained how the acceptability of an image is determined • Image quality (IQI) check is performed once per day • LDA acceptability test performed at beginning of each shift • Performance of the image quality check is documented and recorded	Y	Hanford has 2 RTR units (WIPP # 2RR1 and 2RR2), referred to as Vault A and Vault B, and 1 SWB RTR unit (WIPP #2RR3). At the start of a shift, an image quality check (IQI) is performed to ensure proper recording of the examination. Performance of the IQI for batch WR-TB-2007-126 was demonstrated to EPA and EPA also verified this check on the audio/visual recordings for batches WR-TB-2007-060, WR-TB-2007-098, WR-TB-2007-089, WR-TB-2007-095, WR-TB-2007-093, and WR-TB-2007-069. All IQI reviewed met the required acceptance criterion. The RTR units used for examination of drums also have the ability to generate a linear diode array image (LDA) that provides a static view of the entire contents of each drum. Two images, 90^{o} apart, are recorded for each drum. This is a useful tool for the operators as they normally only "see" part of each drum at any one time. Although the LDA images are not included in batch data reports (BDR), they are stored electronically and are available for review at anytime. Objective evidence: 1. RTR Batch Data Report for SWB: WR-TB-2007-091, WR-TB-2007-093 (S5000, debris waste) 2. RTR Batch Data Report for drums: WR-TB-2007-

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/ Comment
				060, WR-TB-2007-069, WR-TB-2004-297, WR-TB-2005-177 (S5000, debris waste) 3. RTR Batch Data Report for drums: WR-TB-2007-089, WR-TB-2007-098 (S3000, solid waste)
RTR-4: The procedure allows the operator to adjust the RTR to accommodate the physical properties of the waste and waste containers likely to be encountered at the site	Y WRP1-OP-0908, R. I, Change 9, s. 5.9 WRP1-OP-0909, R. E, Change 0, s. 5.4	• Operator could identify applicable policies and procedures governing the operation of RTR equipment • The RTR system could be adjusted • High-density material was examined with the X-ray device set on the maximum voltage and low density material at a lower voltage • Operator adequately explained what is done if an image is unacceptable (e.g., the waste is solidified or the container is lead-lined) • Both sides of the SWB examined	Y	The drum/SWB RTR operators interviewed were knowledgeable and able to answer all questions asked by EPA. During the drum and SWB demonstration the operator changed the Kv setting to accommodate the density of different materials and adjusted the unit as needed to obtain the clearest images of the waste items. Both sides of an SWB are examined and EPA verified this by review of previously generated audio/visual recordings. The operators were able to explain the NCR process and in what circumstances an NCR would be initiated. EPA reviewed selected NCRs to ensure that they were complete and processed in accordance with site procedures. It has been difficult for the operators to determine is the S3000 (solids) drums are vented. Consequently all S3000 containers are now being vented at T-Plant. Objective evidence: 1. Nonconformance Reports (NCR): TRU-WRP-07NCR-078, TRU-WRP-07NCR-052, TRU-WRP-07NCR-070, TRU-WRP-06NCR-126 2. RTR Batch Data Report for SWB: WR-TB-2007-091, WR-TB-2007-093 (S5000, debris waste) 3. RTR Batch Data Report for drums: WR-TB-2007-060, WR-TB-2007-069, WR-TB-2004-297, WR-

ATTACHMENT A.6 REAL-TIME RADIOGRAPHY (RTR) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 04-07, 2007
DRUM AND SWB REAL-TIME RADIOGRAPHY (WRAP)

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/ Comment
				TB-2005-177 (S5000, debris waste) 4. RTR Batch Data Report for drums: WR-TB-2007-089, WR-TB-2007-098 (S3000, solid waste) 5. Audio/visual recording of RTR events for selected drums and SWBs for the above BDRs
RTR-5:	Y WRP1-OP-0908, R. I, Change 9, s. 5.9.2 WRP1-OP-0909, R. E, Change 0, s. 5.9.2	• RTR tape is high quality, the sound track is audible, and the required information is contained on the audible portion of the tape • The RTR tape is consistent with the data package for the same drum.	Y	EPA compared the written record (BDR) and the audio/visual recordings for the following containers to ensure consistency: Drum 013132, original and replicate (S5000) SWB RHZ-219-940001 (S5000) Drums 24-01 and 26-11 (S5000) Drum 0037923 (S5000) Drum 5625 (S3000) Drum 005921 (S3000) EPA did not identify any differences between the written and audio/visual records for these containers. Objective evidence: 1. RTR Batch Data Report for SWB: WR-TB-2007-091, WR-TB-2007-093 (S5000, debris waste) 2. RTR Batch Data Report for drums: WR-TB-2007-060, WR-TB-2007-069, WR-TB-2004-297, WR-TB-2005-177 (S5000, debris waste) 3. RTR Batch Data Report for drums: WR-TB-2007-089, WR-TB-2007-098 (S3000, solid waste) 4. Audio/visual recording of RTR events for selected

ATTACHMENT A.6 REAL-TIME RADIOGRAPHY (RTR) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 04-07, 2007
DRUM AND SWB REAL-TIME RADIOGRAPHY (WRAP)

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/ Comment
				drums and SWBs for the above BDRs
RTR-6: There is a procedure for determining whether the waste matches the waste stream description and Waste Matrix Code, and for determining Waste Material Parameters and weights	Y WRP1-OP-0908, R. I, Change 9, Figure 1, Table 2 & 3 WRP1-OP-0909, R. E, Change 0, Attachment 1 - 6	• The procedure is adequately implemented • Operators verify that the waste matches the waste stream description • Waste Matrix Code is verified. If not, corrective action is taken • WMP weights are estimated by compiling an inventory of waste items and residual/packaging materials • Does the RTR operator use a standard weight lookup table to provide an estimate of WMP weights? If so, has the table been updated to reflect additional information gained through previous RTR/VE exams or updated AK information?	Y	During the on-site demonstration, the drum and SWB operators scanned the containers as required, using the procedure prescribed Y-axis reference points to ensure complete coverage of the containers. WMPs were identified and entered electronically into a data sheet. At the end of the examination, the WMP weights were estimated and recorded. Both the drum and SWB procedure contain a table that provides standard weights for some items. The list is not comprehensive and the operator uses experience and training to assign the weights. During the demonstration, the operator also "jogged" the drum to determine the presence/absence of free liquids. The SWB RTR unit has a "shake" button that moves the SWB to enable the operator to verify the presence/absence of prohibited liquid. As part of the demonstration, the operators verified that the waste matched the waste stream description and the Waste Matrix Code. The absence/presence of prohibited items was recorded on the data sheet as part of the demonstration. Objective evidence: 1. RTR Batch Data Report for SWB: WR-TB-2007-091, WR-TB-2007-093 (S5000, debris waste) 2. RTR Batch Data Report for drums: WR-TB-2007-060, WR-TB-2007-069, WR-TB-2004-297, WR-TB-2005-177 (S5000, debris waste) 3. RTR Batch Data Report for drums: WR-TB-2007-089, WR-TB-2007-098 (S3000, solid waste) 4. Audio/visual recording of RTR events for selected

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/ Comment
				drums and SWBs for the above BDRs
RTR-7: The RTR procedure provides instructions for identifying prohibited items and for processing drums containing prohibited.	Y WRP1-OP-0908, R. I, Change 9, s. 5.9.6 WRP1-OP-0909, R. E, Change 0, s. 5.4.5, 5.7.4, Attachment 1	• Operator could name prohibited items • Operator adequately explained how the presence of free liquids is determined • Operator's explanation of required actions if prohibited items were encountered was consistent with procedure • Corrective actions are taken when necessary	Y	During the demonstration, the operator also "jogged" the drum to determine the presence of free liquids. The SWB RTR unit has a "shake" button that moves the SWB to enable the operator can verify the presence/absence of prohibited liquid. The SWB procedure contains an equation for calculation of liquid in cylinders. The operator interviewed confirmed that this calculation is used but is not recorded. EPA generated concern HAN-06-RTR-004CR to address this issue. HAN-06-RTR-004CR: Attachment 4 of procedure WRP1-OP-0909, Revision E, Change 0, provides a calculation equation for liquid in cylinders. The result of this equation is used to assess if an amount of liquid in an SWB meets the criterion for a prohibited item. The procedure does not require the calculation to be documented and it is not available fore independent review. The operators were not always able to determine if the S3000 solid drum liners were vented. Consequently all of the S3000 containers are being vented at T-Plant and the drums held for the required DAC prior to flammable gas sampling. The operators were able to explain to EPA how and when a non-conformance report (NCR) would be issued for RTR. To verify correct documentation and disposition EPA reviewed selected NCRs as part of the on-site inspection. All NCRs reviewed were complete and appropriately dispositioned.

ATTACHMENT A.6 REAL-TIME RADIOGRAPHY (RTR) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 04-07, 2007
DRUM AND SWB REAL-TIME RADIOGRAPHY (WRAP)

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/ Comment
				Objective evidence: 1. Nonconformance Reports (NCR): TRU-WRP-07NCR-078, TRU-WRP-07NCR-052, TRU-WRP-07NCR-070, TRU-WRP-06NCR-126 2. RTR Batch Data Report for SWB: WR-TB-2007-091, WR-TB-2007-093 (S5000, debris waste) 3. RTR Batch Data Report for drums: WR-TB-2007-060, WR-TB-2007-069, WR-TB-2004-297, WR-TB-2005-177 (S5000, debris waste) 4. RTR Batch Data Report for drums: WR-TB-2007-089, WR-TB-2007-098 (S3000, solid waste) 5. Audio/visual recording of RTR events for selected drums and SWBs for the above BDRs 6. S3000 drum status, including documentation of venting at T-Plant 7. Drum Venting Container Checklist for drum #s 0005398, 0005418, 0005654, 0005771, 0005833
RTR-8: RTR procedures include the required QC examinations, evaluation accuracy and reproducibility of the RTR process	Y WRP1-OP-0908, R. I, Change 9, s. 5.5, 5.6 WRP1-OP-0909, R. E, Change 0, s. 5.5, 5.6	• An independent replicate scan is performed on one waste container per day or on one container per testing batch (whichever is less frequent) • An independent observation of one scan (not the replicate) is performed, by a qualified RTR operator (anyone but the initial RTR operator)	Y	EPA verified that the required QC was performed by review of written and audio/visual records for selected BDRs. In batch WR-TB-2007-069 (drum, S5000), an independent observation was performed on container 0037633 and a replicate scan was performed on container 0037676. In batch WSR-TB-2007-089 (drum, S3000) an independent observation was performed on container 0006981 and a replicate scan was performed on container 0007026. In batch WR-TP-2007-095 (SWB, S5000), an independent observation was performed on container 0014593 and a replicate scan was performed on container RHZ-219-940001. The QC

ATTACHMENT A.6 REAL-TIME RADIOGRAPHY (RTR) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 04-07, 2007
DRUM AND SWB REAL-TIME RADIOGRAPHY (WRAP)

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/ Comment
				samples were performed by a different operator than the original. Objective evidence: 1. RTR Batch Data Report for SWB: WR-TB-2007-091, WR-TB-2007-093 (S5000, debris waste) 2. RTR Batch Data Report for drums: WR-TB-2007-060, WR-TB-2007-069, WR-TB-2004-297, WR-TB-2005-177 (S5000, debris waste) 3. RTR Batch Data Report for drums: WR-TB-2007-089, WR-TB-2007-098 (S3000, solid waste) 4. Audio/visual recording of RTR events for selected drums and SWBs for the above BDRs
RTR-9: Procedure(s) contain standardized forms for recording RTR data.	Y WRP1-OP-0908, R. I, Change 9, Figure 1, Table 1 – 5 WRP1-OP-0909, R. E, Change 0, Attachment 1	• RTR operator adequately explained the process followed for examining a drum/SWB and entering data into data forms (whether hard copy or electronic data entry is used) • Direct entry of data into an electronic form is done by the RTR operator using a computer while the operator is still in the RTR booth • The electronic data file undergoes the same quality control (QC) checks used for hand-written data entries	Y	During the on-site demonstrations, operators entered data into electronic forms. A single operator performed the examination and also entered the data. EPA reviewed data sheets contained in selected BDRs and all data had been subjected to the required reviews. Objective evidence: 1. RTR Batch Data Report for SWB: WR-TB-2007-091, WR-TB-2007-093 (S5000, debris waste) 2. RTR Batch Data Report for drums: WR-TB-2007-060, WR-TB-2007-069, WR-TB-2004-297, WR-TB-2005-177 (S5000, debris waste) 3. RTR Batch Data Report for drums: WR-TB-2007-089, WR-TB-2007-098 (S3000, solid waste) 4. Audio/visual recording of RTR events for selected drums and SWBs for the above BDRs

ATTACHMENT A.6 REAL-TIME RADIOGRAPHY (RTR) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 04-07, 2007
DRUM AND SWB REAL-TIME RADIOGRAPHY (WRAP)

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/ Comment
RTR-10: Site procedures require review of Batch Data Reports (BDRs) at the data generation and project level	Y WMP-400, s. 7.1.6 (project level) WMP-350, s. 2.3, 4.3.1, Attachment 3 (ITR level)	• Data generation level reviews are performed and documented (ITR) • Project level reviews are performed and documented (SPM)	Y	All of the BDRs reviewed by EPA had been reviewed at both the generation and project level. Objective evidence: 1. RTR Batch Data Report for SWB: WR-TB-2007-091, WR-TB-2007-093 (S5000, debris waste) 2. RTR Batch Data Report for drums: WR-TB-2007-060, WR-TB-2007-069, WR-TB-2004-297, WR-TB-2005-177 (S5000, debris waste) 3. RTR Batch Data Report for drums: WR-TB-2007-089, WR-TB-2007-098 (S3000, solid waste)

Information included in BDR

Required Testing Batch Content	Present? Y or No	Required Testing Batch Content	Present? Y or N	Required Testing Batch Content	Present? Y or N
Batch Date	Y	Estimated weights for Waste Material Parameters	Y	Operator signature and test date	Y
Report date	Y	Layers of confinement	Y	Data generation checklist	Y
Waste container number	Y	Indication of vented rigid liners	Y	Project level checklist	Y
Waste Matrix Code	Y	Description of container contents	Y		
Videotape reference	Y	Indication of sealed containers >4L	Y		
Description of liners	Y	Amount of free liquid	Y		
QC documentation	Y	Container gross weight	Y		
Verification that waste matches waste stream description	Y	Reference to or copies of any NCRs	Y		

ATTACHMENT A.7 VISUAL EXAMINATION (VE) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 04-07, 2007
Visual Examination (VE) at WRAP Facility

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
VE-1: Site procedures identify required training and qualifications for VE personnel.	Y WMP-400, R 20, s. 1.2.2, 2.1.1	• Visual Examination Expert's (VEE) appointed. • VE personnel's training was consistent with applicable procedures. • VE personnel's certification is current. • VE personnel are re-qualified every two years • VE personnel received training on specific waste generating processes, typical packaging configurations, WMPs expected in each Waste Matrix Code.	Y	Hanford's TRU Project Employee Job Analysis documents the training and reading required to qualify VE operators and VEEs. Qualification Cards record training completed and the date of completion. The training records verified that VE personnel had received the required training: • TRU Program course 300921B • Course 035010, Waste Designation • On-the-job training (OJT) • Required reading All records were readily retrieved and were complete. Training records confirmed that only qualified personnel are used to perform VE in the WRAP facility. Objective evidence: 1. TRU Project Employee Job Analysis for WRAP glove-box operator and three (3) Visual Examination Expert (VEE) 2. TRU VE Expert/Technican OJT Qualification Card for two (2) VEEs Re-certification memo, dated 8/22/06, for three (3) VE Expert/Technicians
VE-2: Procedures and technical guidance documents provide complete instructions for performing VE.	Y WRP1-OP-0729, R. C, Change 1, s. 5.5 - 5.11	• Audio/visual recording of VE event includes: date, container ID #, waste items, WMPs, operators. • Procedures are sufficiently detailed to enable the operator to determine if a waste container meets the criteria of '194.24 with regard to identifying applicable parameters	Y	At the time of the inspection, Hanford was not performing VE activities and could not demonstrate this process. However, EPA used the audio/visual records of previous VE events to evaluate the effective implementation of procedure WRP1-OP-0729. EPA determined that the VE procedure contained sufficient information and instructions for VE technicians to generate the required VE data. EPA concurrently reviewed the audio/visual recordings with

ATTACHMENT A.7 VISUAL EXAMINATION (VE) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 04-07, 2007
Visual Examination (VE) at WRAP Facility

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
	Attachment 1	with waste limits.		written BDRs to ensure that the data contained in both were the same. EPA did not identify any discrepancies. By review of the audio/visual recordings EPA also verified that image quality checks were performed as required. WMPs were identified and recorded as required and the Waste Matrix Code (WMC) was verified. The absence of prohibited items was recorded for each container in the batches reviewed. The calibration and correct function of the scale used to weigh WMPs was verified prior to weighing. Objective evidence: 1. Batch Data Report VE-TB-2006-291(S5000) 2. Audio/visual recording for BDR VE-TB-2006-291 3. Batch Data Report VE-TB-2006-293 (S5000) 4. Audio/visual recording for BDR VE-TB-2006-293
VE-3:	Y WRP1-OP-0729, R. C, Change 1, s. 5.6, Attachment 1 & 2, Table 1	• If an automated data entry system is used, data entry VE personnel could navigate through the various screens • A calibrated scale is used to weigh WMPs • VE personnel have access to standardized charts or tables to aid in the consistent estimation or assignment of weights, waste material parameters, and waste matrix codes.	Y	Hanford uses electronic data entry to record VE data. EPA concurrently reviewed written records (BDR) audio/visual recordings for the same containers to ensure the data recorded were consistent. EPA did not identify any discrepancies in the records reviewed. On each visual record reviewed the scale, used for WMP weight determination, was checked to ensure correct operation. Procedure WRP1-OP-0729 contains a list of standard weights but only for a limited number of items. In the VE event records reviewed all WMPs were weighed. Objective evidence: 1. Batch Data Report VE-TB-2006-291(S5000) 2. Audio/visual recording for BDR VE-TB-2006-291

ATTACHMENT A.7 VISUAL EXAMINATION (VE) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 04-07, 2007
Visual Examination (VE) at WRAP Facility

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				3. Batch Data Report VE-TB-2006-293 (S5000) 4. Audio/visual recording for BDR VE-TB-2006-293
VE-5: There is a procedure for handling instances when the VE Expert is unable to see through the inner plastic bags, packages and/or containers of waste.	Y WRP1-OP-0729, R. C, Change 1, s. 5.9, Attachment 1	• The VEE has decision-making criteria for assessing the need to open the bags/packages in order to identify all of their contents • If the bags are not opened, a brief written description of the contents of the bags is prepared with estimates of the amount of each waste type in the bags • References tables are updated as site gains information from VE	Y	On the audio portion of selected VE event recordings, the VEE could be heard directing the VE event. The VE process includes assembling and numbering WMP packages from the container waste. The package weights are recorded and the waste placed in the receiving container. Procedure WRP1-OP-0729 contains a list of standard weights but for a limited number of items. In the VE records reviewed all WMPs were weighed. Objective evidence: 1. Batch Data Report VE-TB-2006-291(S5000) 2. Audio/visual recording for BDR VE-TB-2006-291 3. Batch Data Report VE-TB-2006-293 (S5000) 4. Audio/visual recording for BDR VE-TB-2006-293
VE-6: The VE procedure requires verification of Waste Matrix Code and WMP weights. Procedure provides instructions for processing of containers with prohibited items.	Y WRP1-OP-0729, R. C, Change 1, s. 5.9, Attachment 1	• WMPs are identified, weighed and recorded on a data sheet, including all discernible waste items, residual materials, and packaging are recorded • A VE data form is used to document verification of the physical form of the waste and the Waste Matrix Code • Absence/presence of prohibited items • Operators explained required actions if prohibited items were encountered	Y	At the time of the inspection, Hanford was not performing any VE activities and could not demonstrate this process. However, EPA used the audio/visual records of previous VE events to evaluate the implementation of procedure WRP1-OP-0729. EPA determined that the VE procedure contained sufficient information and instructions for VE technicians to generate the required VE data. EPA concurrently reviewed the audio/visual recordings with written BDRs to ensure that the data contained in both were the same. EPA did not identify any discrepancies. By review of the audio/visual recordings EPA also verified that image quality checks were performed as required.

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				WMPs were identified and recorded as required and the Waste Matrix Code (WMC) was verified. The absence of prohibited items was recorded for each container in the above batches. The calibration and correct function of the scale used to weigh WMPs was verified prior to weighing. Objective evidence: 1. Batch Data Report VE-TB-2006-291(S5000) 2. Audio/visual recording for BDR VE-TB-2006-291 3. Batch Data Report VE-TB-2006-293 (S5000) 4. Audio/visual recording for BDR VE-TB-2006-293
VE-7: WRP1-OP-0729, R. C, Change 1, s. 5.9.3, 5.9.10, Attachment 1	Y	• Replicate weighing performed on at least one waste item, as per VEE instruction. • Corrective action is taken when necessary.	N	Waste packages were weighed on a calibrated scale. The VE procedure requires at least one replicate weighing to be performed during each VE event, but no acceptance criteria were attached to this QC activity. EPA generated concern HAN-06-VE-005CR to address this issue. HAN-06-VE-005CR Procedure WRP1-OP-0729, Revision C, Change 1, section 5.9.10 requires that at least one replicate weighing be performed per VE event to assess precision. This quality control activity is performed but there are no acceptance limits attached to the replicate weighings. Without acceptance limits to define the weighing precision, the site cannot demonstrate that the required precision has been achieved. NCRs were generated as needed. BDR VE-TB-2006-291 contained TRU-WRP-06NCR-130, which was closed and appropriately dispositioned. Objective evidence:

ATTACHMENT A.7 VISUAL EXAMINATION (VE) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 04-07, 2007
Visual Examination (VE) at WRAP Facility

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				1. Batch Data Report VE-TB-2006-291(S5000) 2. Audio/visual recording for BDR VE-TB-2006-291 3. Batch Data Report VE-TB-2006-293 (S5000) 4. Audio/visual recording for BDR VE-TB-2006-293
VE-8:	Y WRP1-OP-0729, R. C, Change 1, Attachment 1	• The gross weight of the waste container (container plus contents) is recorded on the VE data form. • Volume utilization of the container is documented.	Y	EPA reviewed two (2) BDRs containing the VE data for a total of 8 containers. The data sheets were completed correctly for all of the containers and included the gross container weight and volume utilization of the container. Objective evidence: 1. Batch Data Report VE-TB-2006-291(S5000) 2. Audio/visual recording for BDR VE-TB-2006-291 3. Batch Data Report VE-TB-2006-293 (S5000) 4. Audio/visual recording for BDR VE-TB-2006-293
VE-10: Site procedure(s) require data generation and project level reviews of Batch Data Reports (BDRs).	Y WMP-350, R.23, s. 2.3, Attachment 4 (ITR) WMP-400, R. 19, s. 7.1.6, Attachment 9 (project level)	• ITR review is performed and documented • Project level review is performed as required (SPM)	Y	The two (2) BDRs provided to EPA had been reviewed at both the data generation and project level. Objective evidence: 1. Batch Data Report VE-TB-2006-291(S5000) 2. Audio/visual recording for BDR VE-TB-2006-291 3. Batch Data Report VE-TB-2006-293 (S5000) 4. Audio/visual recording for BDR VE-TB-2006-293

Information Included in BDR

Required Testing Batch Content	Present? Y or N	Required Testing Batch Content	Present? Y or N	Required Testing Batch Content	Present? Y or N
Batch Date	Y	Description of liners	Y	Verification of Waste Matrix Code	Y
Report date	Y	Layers of confinement	Y	Reference to or copies of any NCRs	Y
Waste container number	Y	Indication of vented rigid liners	Y	VEE decisions	Y
Waste Matrix Code	Y	Description of container contents	Y	Operator signature and test date	Y
Implementing procedure name or #	Y	Indication of sealed containers >4L	Y	VEE signature and test date	Y
Videotape reference	Y	Amount of free liquid	Y	Completed ITR checklist	Y
QC documentation	Y	Container gross weight	Y	Completed SPM checklist	Y
Verification that waste matches waste stream description	Y	Waste Material Parameters weights	Y		

ATTACHMENT A.8: VISUAL EXAMINATION TECHNIQUE (VET) INSPECTION CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 27, 2007
ZO-170-057 (VET for PFP Debris Waste)
ZO-170-044 (Load SWB Storage Containers with TRU Waste)
ZO-160-080 (Pipe-N-Go Operations)

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
VET-1: Site procedures identify required training and qualifications for VET personnel.	Y WMP-400, R 20, s. 1.2.2, #8, 4.8	• VE personnel's training was consistent with applicable procedures • VE personnel's certification is current • VE personnel are re-qualified every two years • VE personnel received training on specific waste generating processes, typical packaging configurations, WMPs expected to be found in each Waste Matrix Code	Y	EPA reviewed training records for VET personnel during the on-site inspection. All of the operators performing the on-site demonstrations were designated as Nuclear Chemical Operators (NCO). Hanford's TRU Project Employee Job Analysis documents the training and reading required to qualify VET operators. Training for VET operators included the required elements: • TRU Program course 300921B • Course 200350, Visual Examination Technique Training • OJT • Required reading EPA reviewed the training bulletins for the two (2) waste streams being processed at Hanford at the time of the inspection. Both of these waste streams are S5000 debris waste. Qualification Cards record training completed and the date of completion. All records reviewed were complete and demonstrated that only trained and qualified individuals perform VET. Objective evidence: 1. TRU Project Personnel Summary for three (3) VET operators 2. TRU Visual Examination Technique Personnel Qualification Card for one (1) NCO 3. List of trained "PFP D & D VE Technique Personnel" for procedure ZO-160-080 4. List of trained "PFP D & D VE Technique Personnel" for procedures ZO-170-044 and ZO-170-057 5. WMP Training Bulletin TB-T-001, Acceptable Knowledge Documentation Management, Plutonium Finishing Plant Waste

ATTACHMENT A.8: VISUAL EXAMINATION TECHNIQUE (VET) INSPECTION CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 27, 2007
ZO-170-057 (VET for PFP Debris Waste)
ZO-170-044 (Load SWB Storage Containers with TRU Waste)
ZO-160-080 (Pipe-N-Go Operations)

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				Stream NPFPD 6. WMP Training Bulletin TB-T-99-003, Acceptable Knowledge Documentation Management, Plutonium Finishing Plant Waste Stream MPFPD
VET-2: Procedures and technical guidance documents provide complete instructions for performing VET.	Y ZO-170-057, R. C, Change 8, Attachment 2 & 3, Data Sheet 1-4 ZO-170-044, R. F, Change 24, Attachment 1 - 3, Data Sheet 3 - 5 WMP-400, R. 8, 7.1.10 ZO-160-080, R. C, Change 19, Attachment 2, Data Sheet 1-6	• Two trained operators perform VET • Procedures are sufficiently detailed to enable the operator to determine if a waste container meets the criteria of '194.24 with regard to identifying applicable parameters with waste limits • Establish standard nomenclature, based on current site practice, so that all staff recognize waste by the same descriptors	Y	EPA observed mock-up demonstrations for each of the three (3) VET processes performed at Hanford. EPA observed a demonstration of procedure ZO-160-080 in PFP, Building 234-5, Room 336. Actual VET for this procedure is performed in Room 170 of the same building. The demonstration was performed in the training glove-box which was not set up to be operational in that no gloves were attached to the box. However, Hanford was able to successfully demonstrate performance of the VET process using MOX (an inorganic absorbent material). An NCO read aloud from the procedure so that the required actions could be performed by a VET technician. A second VET operator recorded VET data as they were generated. WMPs were identified and weighed on a calibrated scale and prohibited items were identified and recorded as required by the procedure. The NCO recording the VET data used the required data sheets from the procedure. The scale and weights calibration dates were recorded as well as the equipment identification numbers (scale: 840-66-01-003, weights: 840-86-02-195). The waste was then placed in a billet can and this can was sealed as required. In normal operations, the can would then go the NDA for analysis and then be packaged in a POC in accordance with procedure ZO-160-080 (see below). Procedure ZO-170-057 was demonstrated to EPA for product receiver (PR) can # 871. The demonstration took place in Room-172 of PFP, Building 234-5. PR cans consist of an inner vessel where the product was placed and an outer container. The entire assembly is referred to as the PR can. These cans were used to transport liquid plutonium nitrate in

ATTACHMENT A.8: VISUAL EXAMINATION TECHNIQUE (VET) INSPECTION CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 27, 2007
ZO-170-057 (VET for PFP Debris Waste)
ZO-170-044 (Load SWB Storage Containers with TRU Waste)
ZO-160-080 (Pipe-N-Go Operations)

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				the 1980s and are now considered to be waste items. VET was performed to verify the absence of liquid. The PR can is considered waste and is packaged in an SWB for disposal (procedure ZO-160-080, see below). The data sheets in the procedure were completed during the demonstration to record the absence of prohibited items and WMPs. The packaging of PR can # 871 into an SWB # 0037384 was used by Hanford to demonstrate implementation of procedure ZO-170-044. As with procedure ZO-160-080, an NCO read aloud from the procedure so that the actions required could be performed by a VET technician. A cradle was used in the SWB to stabilize the PR can and the cradle WMP components were correctly recorded. WPMs were initially recorded as percentages and the absence of prohibited items was also recorded. It is Hanford's normal practice is to load two (2) PR cans in each SWB and consider them "full" with a fill factor of 70%. Filled and sealed SWBs are weighed which allows the WMP weights to be calculated from the assigned percentages. The scale check performed did not have any tolerance limits attached and so Hanford could not verify that the required scale accuracy had been achieved. EPA generated concern EPA-HAN-06-VE-007CR to address this issue. EPA-HAN-06-VE-007CR Scale No. 840-66-06-010 within the Plutonium Finishing Plant (PFP) at Hanford is used to weight Standard Waste Boxes (SWBs). This scale is checked before use with items of known weight however the acceptability of the scale's operation cannot be verified because Work Plan 2Z-05-2127, Attachment A does not provide acceptance ranges for the weights used. As stated, the work plan requires only that the check be performed but is silent regarding the scale's acceptable tolerance. For each procedure, EPA reviewed BDRs to further verify that data were recorded as required and the data sheets were complete. EPA did not identify any problems with these processes nor with the written records

ATTACHMENT A.8: VISUAL EXAMINATION TECHNIQUE (VET) INSPECTION CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 27, 2007
ZO-170-057 (VET for PFP Debris Waste)
ZO-170-044 (Load SWB Storage Containers with TRU Waste)
ZO-160-080 (Pipe-N-Go Operations)

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				(BDR). Objective evidence: 1. PFP-VE-2006-046: Procedure ZO-170-057 and ZO-170-044 2. PFP-VE-2006-055: Procedure ZO-170-057 and ZO-170-044 3. PFP-VE-2006-065: Procedure ZO-170-057 and ZO-170-044 4. PFP-VE-2007-002: Procedure ZO-160-080
VET-3: The VET procedure requires verification of the physical form of the waste and presence or absence of prohibited items.	Y ZO-170-057, R. C, Change 8; Attachment 2, Data Sheet 1, 2 & 4: ZO-170-044, R. F, Change 24, Attachment 1 - 3, Data Sheet 3; ZO-160-080, R. C, Change 19, Data Sheet 1-6	• WMPs are identified, weighed and recorded on a data sheet • A VET data form is used to document verification of the physical form of the waste and the Waste Matrix Code (WMC) • If an automated data entry system is used, data entry VET personnel could navigate through the various screens • A calibrated scale is used to weigh WMPs • VET staff have access to standardized charts or tables to aid in the consistent estimation/assignment of WMP weights	Y	All WMP weights are derived from actual weighing and hence the procedures do not contain standardized weights for waste items (see above). The procedure data sheets require operators to verify: o Absence of prohibited items o Waste matches the waste stream description o Waste matches the WMC Calibrated scales are used for all weighing and EPA did not identify any scale that was out of calibration. EPA did identify a concern with regard to scale verification and generated concern EPA-HAN-06-VE-007CR to address this issue (see above). For each procedure, EPA reviewed BDRs to further verify that data were recorded as required and the data sheets were complete. EPA did not identify any problems with these processes nor with the written records (BDR). Objective evidence: 1. PFP-VE-2006-046: Procedure ZO-170-057 and ZO-170-044 2. PFP-VE-2006-055: Procedure ZO-170-057 and ZO-170-044

ATTACHMENT A.8: VISUAL EXAMINATION TECHNIQUE (VET) INSPECTION CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 27, 2007
ZO-170-057 (VET for PFP Debris Waste)
ZO-170-044 (Load SWB Storage Containers with TRU Waste)
ZO-160-080 (Pipe-N-Go Operations)

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				3. PFP-VE-2006-065: Procedure ZO-170-057 and ZO-170-044 4. PFP-VE-2007-002: Procedure ZO-160-080
VET-4: Prohibited items	Y ZO-170-057, R. C, Change 8, Attachment 3, Data Sheet 1 ZO-170-044, R. F, Change 24, 4.2.4, 4.3.6, 4.3.9; Attachment 2, Data Sheet 3 - 5	• Presence or absence of prohibited items is documented on the VET data form • VET operators explanation of required actions if prohibited items were encountered	Y	EPA reviewed BDRs to ensure that data sheets were completed as required. No problems with the written records were identified. None of the BDRs reviewed contained non-conformance reports (NCR). During interviews, the NCOs were able to identify prohibited items and describe circumstances when an NCR would be issued. Operators knew how this process would be initiated. Objective evidence: 1. PFP-VE-2006-046: Procedure ZO-170-057 and ZO-170-044 2. PFP-VE-2006-055: Procedure ZO-170-057 and ZO-170-044 3. PFP-VE-2006-065: Procedure ZO-170-057 and ZO-170-044 4. PFP-VE-2007-002: Procedure ZO-160-080
VET-5	Y ZO-170-057, R. C, Change 8, Attachment 3, Data Sheet 2-3 ZO-170-044, R. F, Change 24, Data Sheet 3 - 6 ZO-160-080, R. C, Change 19, Data Sheet 1-5	• The gross weight of the waste container (container plus contents) is recorded on the VE data form • Volume utilization of the container is documented • Packaging configuration, type and number of filters, and rigid liner vent hole (presence and diameter) are documented for each container • Calibrated scale is used for final weighing of drum	Y	ZO-170-044 data sheets record the required information in the following sections: o Gross weight of SWB, data sheet 5, section C o Volume utilization, data sheet 4, section B o Filters, packaging, data sheet 5, section B o Scale identification, data sheet 5, section A ZO-160-080 data sheets record the required information in the following sections: o Gross weight of POC, data sheet 5

Revision No.: Site specific checklist
Date of Revision: 05-27-07

ATTACHMENT A.8: VISUAL EXAMINATION TECHNIQUE (VET) INSPECTION CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 27, 2007
ZO-170-057 (VET for PFP Debris Waste)
ZO-170-044 (Load SWB Storage Containers with TRU Waste)
ZO-160-080 (Pipe-N-Go Operations)

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				o Volume utilization, data sheet 4 o Filter, packaging, data sheet 3 & 5 o Scale identification, data sheet 1 ZO-170-057 data sheets record the required information in the following sections: o Gross weight of drum, data sheet 3, section B o Volume utilization, data sheet 2, section B o Filters, data sheet 2, section A o Scale identification, data sheet 3, section A In the BDRs reviewed, all of the required data were recorded. Objective evidence: 1. PFP-VE-2006-046: Procedure ZO-170-057 and ZO-170-044 2. PFP-VE-2006-055: Procedure ZO-170-057 and ZO-170-044 3. PFP-VE-2006-065: Procedure ZO-170-057 and ZO-170-044 4. PFP-VE-2007-002: Procedure ZO-160-080
VET-6: Procedures and technical guidance documents provide complete instructions for performing VET.	Y WMP-400, 1.3.2 & 1.3.3 ZO-160-080, R. C, Change 19 ZO-170-044, R. F, Change 24	• The procedure is adequately implemented • Corrective actions are taken when necessary	Y	During the on-site demonstrations, an operator read directly from the applicable procedure to guide the performance of the VET. Completed BDRs demonstrated that the required data were recorded and reviewed. None of the BDRs reviewed contained non-conformance reports (NCR). NCOs were able to identify prohibited items and describe circumstances when an NCR would be issued. Operators knew how this process would be initiated.

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EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 27, 2007
ZO-170-057 (VET for PFP Debris Waste)
ZO-170-044 (Load SWB Storage Containers with TRU Waste)
ZO-160-080 (Pipe-N-Go Operations)

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
	ZO-170-057, R. C, Change 8			Objective evidence: 1. PFP-VE-2006-046: Procedure ZO-170-057 and ZO-170-044 2. PFP-VE-2006-055: Procedure ZO-170-057 and ZO-170-044 3. PFP-VE-2006-065: Procedure ZO-170-057 and ZO-170-044 4. PFP-VE-2007-002: Procedure ZO-160-080
VET-7: Site procedure(s) require data generation and project level reviews of Batch Data Reports (BDRs).	Y FSP-PFP-5-8, R. 14, Change 0, s. 4.2 (BDR); WMP-400, R. 8, 7.1.10, Attachment 5 (ITR); WMP-400, R. 8, 7.1.6 (project level)	• Data generation level reviews are performed and documented (ITR) • Project level reviews are performed and documented (SPM)	Y	All of the BDRs reviewed had been through data generation and project level reviews. The BDRs also contained a Site Project Manager Validation Report for Visual Examination Technique Batch Data Report memorandum. Objective evidence: 1. PFP-VE-2006-046: Procedure ZO-170-057 and ZO-170-044 2. PFP-VE-2006-055: Procedure ZO-170-057 and ZO-170-044 3. PFP-VE-2006-065: Procedure ZO-170-057 and ZO-170-044 4. PFP-VE-2007-002: Procedure ZO-160-080

ATTACHMENT A.9 WIPP WASTE INFORMATION SYSTEM (WWIS) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 04 – 07, 2007

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
WWIS-1: WWIS and Data Entry Personnel must be trained to assess data and properly enter data into the WWIS.	Y WMP-400, R. 20, s. 1.2.2, 2.2.1, #6 (WCO)	• Data generation level reviews are performed and documented (ITR). • WCO and Data Entry Personnel are trained to assess data and properly enter and transfer all data in the WWIS. • Training for Data Entry Personnel and data reviewers/verifiers include the WIPP Waste Information System User's Manual and the applicable site procedures. • Training records are available for review and are complete.	Y	EPA reviewed training records for both data entry personnel and Waste Certification Officers (WCO). The WCO training included TRU program course 300921B, 300920 AK document management, WWIS training, on-the-job (OJT) training and required reading. Training also included the WIPP Waste Information System User's Manual. All records reviewed were complete and up-to-date. Objective evidence: 1. WWIS Data Entry Personnel Training record and WCO training record 2. List of data entry personnel and WCOs 3. WWIS password request email for data entry person
WWIS-2: Security measures for ensuring data integrity and accessing WWIS are sufficient.	Y WMP-400, s. 7.1.5, R. 17, s. 4.1	Access to WWIS is controlled. WWIS access requests are recorded in an access log, however named, that is available for review.	Y	The site requests access and a password when needed and are informed by email when the access is granted. These emails are retained for reference. Objective evidence: 1. WWIS password request email for data entry person
WWIS-3: There are adequate procedures for entering data into the WWIS and transmitting data to WIPP.	Y WMP-400, s. 7.1.5, R. 17, s. 4.2.1 - 4.2.3	Employee's explanation of job duties was consistent with applicable procedures. WWIS and Data Entry Personnel adequately explained how data are assessed, input, and transferred into WWIS.	Y	EPA observed a data entry person enter data into WWIS for container H-0027760. After entry, the data are reviewed for accuracy and submitted to a WCO for further review. Only after WCO approval are the data transmitted to WWIS. Containers with NCRs are identified during data reconciliation and are not processed until all NCRs are closed. Procedure WMP-400, Section 7.1.5 was implemented as written. Objective evidence: 1. Waste Container Data Report for containers H-0027760 and H-4631560 2. WWIS Characterization Data Report Verification Signoff Sheet for container H-0027760 (pre-submittal to

ATTACHMENT A.9 WIPP WASTE INFORMATION SYSTEM (WWIS) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 04 – 07, 2007

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				Characterization Approval) 3. Characterization data sheets for container 0027760
WWIS-4: Procedures require that only verified and validated data are entered into WWIS.	Y WMP-400, s. 7.1.5, R. 17, s. 4.2.1#6, 4.2.2. #6, 4.2.3 #7	1. Data for entry into WWIS obtained from WCO. 2. WWIS Data Report Verification Signoff Sheet to WCO after data entry.	Y	EPA reviewed the signoff sheet for container H-0027760 during the on-site inspection Objective evidence: 1. Waste Container Data Report for containers H-0027760 and H-4631560 2. WWIS Characterization Data Report Verification Signoff Sheet for container H-0027760 (pre-submittal to Characterization Approval) 3. Characterization data sheets for container 0027760
WWIS-5: Procedures include instructions for submission of data into the Characterization and the Certification module of WWIS.	Y WMP-400, s. 7.1.5, R. 17, s. 4.2.1#6, 4.2.2. #6	• To enable Waste Stream Profile Form approval Data are entered into the Characterization module of WWIS on a container basis. • To obtain shipping certification of a container data are entered into the Certification module of WWIS.	Y	For a new waste stream, a Waste Stream Profile Package, identifying the containers to be used for characterization, is compiled and sent to CBFO for approval. Characterization data that are entered into the Characterization module of WWIS are only transferred to the Certification module after the WWIS administrator provides a final approval. After approval, data are entered into the Certification module only. The Waste Container Data Report provides the status of the subject container and contains all of the characterization data entered into WWIS. Hanford has successfully shipped many containers for disposal at WIPP demonstrating that the WWIS process used is appropriate and implemented as required. Objective evidence: 1. Waste Container Data Report for containers H-0027760 and H-4631560 2. Characterization data sheets for container 0027760

ATTACHMENT A.9 WIPP WASTE INFORMATION SYSTEM (WWIS) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 04 – 07, 2007

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
WWIS-6: Procedures include a requirement for review of data prior to submission to WWIS.	Y WMP-400, s. 7.1.5, R. 17, s. 4.2.1-4 .2.3	• There is an independent review of data prior to submission to WIPP via the WWIS. • Procedures for resolution/correction of nonconforming data are adequately implemented.	Y	EPA observed a data entry person enter data into WWIS for container H-0027760. After entry, the data are reviewed for accuracy and submitted to a WCO for further review. Only after WCO approval are the data transmitted to WWIS. Containers with NCRs are identified during data reconciliation and are not processed until all NCRs are closed. Procedure WMP-400, Section 7.1.5 was implemented as written. Objective evidence: 1. Waste Container Data Report for containers H-0027760 and H-4631560 2. WWIS Characterization Data Report Verification Signoff Sheet for container H-0027760 (pre-submittal to Characterization Approval) 3. Characterization data sheets for container 0027760
WWIS-7: There are adequate procedures for entering data into the WWIS and transmitting the data to WIPP.	Y WMP-400, s. 7.1.5, R. 17, s. 4.2.1-4 .2.3	The site has successfully submitted characterization and certification data to WIPP via WWIS.	Y	Hanford has successfully shipped many containers for disposal at WIPP demonstrating that the WWIS process used is appropriate and implemented as required. Objective evidence: 1. Waste Container Data Report for containers H-0027760 and H-4631560 2. Characterization data sheets for container 0027760
WWIS-8: Procedures provide instructions for data correction if data are rejected by WWIS.	Y WMP-400, s. 7.1.5, R. 17, s. 4.2.1-4 .2.3 WMP-400, s. 1.3.2, 1.3.3	• e-mail notifications from WWIS (acceptance/modification/rejection of data) • If data are rejected by the WWIS Data Administrator, processes for data reconciliation/correction are implemented • NCR initiated if data rejected by WWIS DA	Y	E-mails from WWIS, informing the site if data has been accepted or rejected, are not retain but Hanford uses the Waste Container Data Report "Certification Data Approved by WIPP" to track the status of containers. If data are rejected by WWIS, an NCR is initiated to resolve the problem unless a simple data entry error had occurred. Objective evidence:

ATTACHMENT A.9 WIPP WASTE INFORMATION SYSTEM (WWIS) CHECKLIST

EPA Inspection No.: EPA-HAN-06.07-8
Inspection Date: June 04 – 07, 2007

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				1. Waste Container Data Report for container H-0027760 2. TRUEDMT (container tracking and management electronic system) print-out for NCR TRU-WRP-07NCR-085
WWIS-9: Procedures for waste container characterization/certification data submittal to WWIS require the appropriate records to be retained.	Y WMP-400, s. 7.1.5, R. 17, s. 4.2.1-4 .2.3	• WWIS access requests • WWIS access logs • Waste container data input reports	Y	The site requests access and a password as needed and are informed by email when the access is granted. These emails are retained for reference. EPA observed a data entry person enter data into WWIS for container H-0027760. After entry, the data are reviewed for accuracy and submitted to a WCO for further review. Only after WCO approval are the data transmitted to WWIS. Containers with NCRs are identified during data reconciliation and are not processed until all NCRs are closed. Objective evidence: 1. Waste Container Data Report for containers H-0027760 and H-4631560 2. WWIS Characterization Data Report Verification Signoff Sheet for container H-0027760 (pre-submittal to Characterization Approval) 3. Characterization data sheets for container 0027760 4. WWIS password request email for data entry person
WWIS-10:	NA	IF SITE PERFORMS LOAD MANAGEMENT: • Plans and procedures for payload management have been approved by CBFO. • CBFO informed EPA prior to approving the site to payload managed containers. • TRU alpha activity concentration is > 100 nCi/g for the entire waste stream. • Only waste containers from the same waste	NA	Hanford does not intend to perform load management.

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
		stream are payload managed in the same payload container. • Each waste container selected for payload management contains at least one TRU isotope. • TRU alpha activity concentration of the payload container is determined and reported.		

WWIS Data Requirements
Characterization Module Data Fields
(List is Not Comprehensive)

Container ID - present	^{239}Pu equivalent activity - present
Generator EPA ID – present	^{239}Pu fissile gram equivalent - present
Site ID - present	^{239}Pu fissile gram equivalent uncertainty - present
Waste Stream Profile Number - present	Radionuclide name - present
Waste Matrix Code - present	Radionuclide activity - present
Waste Matrix Code Group - present	Radionuclide activity uncertainty - present
Waste Material Weight - present	Radionuclide mass - present
Waste Material Parameter - present	Radionuclide mass uncertainty
Hazardous Code - present	Radioassay method - present
Layers of packaging - present	Assay date - present
Liner exists - present	Characterization method - present
Filter model - present	Characterization method date - present
Number of filters installed - present	Alpha surface concentration - present
TRUCON code - present	Dose rate - present
Decay heat – present	Sample ID - present
Decay heat uncertainty - present	Sample type - present
TRU alpha activity - present	Sample date - present
TRU alpha activity uncertainty - present	Analyte - present
TRU alpha activity concentration - present	Analyte concentration - present
TRU alpha activity concentration uncertainty - present	Analyte detection method - present
Waste type code - present	Analyte detection method - present

Certification Module Data Fields

Container ID - present	Container Certification date - present
Container Type - present	Container Closure date - present
Container weight - present	Handling Code - present
Contact Dose Rate - present	

ATTACHMENTS B.1 THROUGH B.10
REPLICATE TESTING

ATTACHMENT B.1 REPLICATE TESTING DATA FOR GEA-A, CONTAINER 0038035

Instrument: **GEA-A**
Container: **0038035**

Quantity of Interest	Original Measurement			Replicate #1			Replicate #2		
	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty
^{233}U Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
^{234}U Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
^{238}U Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
^{238}Pu Activity (Ci)	7.69E-03	1.10E-03	1.44E-01	7.12E-03	1.02E-03	1.44E-01	7.50E-03	1.08E-03	1.44E-01
^{239}Pu Activity (Ci)	1.21E-01	1.74E-02	1.44E-01	1.12E-01	1.61E-02	1.44E-01	1.18E-01	1.69E-02	1.44E-01
^{240}Pu Activity (Ci)	2.77E-02	3.98E-03	1.44E-01	2.56E-02	3.69E-03	1.44E-01	2.70E-02	3.88E-03	1.44E-01
^{242}Pu Activity (Ci)	2.03E-06	2.91E-07	1.44E-01	1.88E-06	2.70E-07	1.44E-01	1.98E-06	2.84E-07	1.44E-01
^{241}Am Activity (Ci)	1.73E-02	2.49E-03	1.44E-01	1.60E-02	2.31E-03	1.44E-01	1.69E-02	2.43E-03	1.44E-01
^{90}Sr Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
^{137}Cs Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
TRU Alpha Conc. (nCi/g)	7.33E+03	1.07E+03	1.46E-01	6.78E+03	9.90E+02	1.46E-01	7.15E+03	1.04E+03	1.46E-01

Quantity of Interest	Replicate #3			Replicate #4			Replicate #5		
	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty
^{233}U Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
^{234}U Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
^{238}U Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
^{238}Pu Activity (Ci)	7.12E-03	1.02E-03	1.44E-01	7.37E-03	1.06E-03	1.44E-01	7.18E-03	1.03E-03	1.44E-01
^{239}Pu Activity (Ci)	1.12E-01	1.61E-02	1.44E-01	1.16E-01	1.67E-02	1.44E-01	1.13E-01	1.63E-02	1.44E-01
^{240}Pu Activity (Ci)	2.56E-02	3.69E-03	1.44E-01	2.66E-02	3.82E-03	1.44E-01	2.59E-02	3.72E-03	1.44E-01
^{242}Pu Activity (Ci)	1.88E-06	2.70E-07	1.44E-01	1.94E-06	2.79E-07	1.44E-01	1.89E-06	2.72E-07	1.44E-01
^{241}Am Activity (Ci)	1.60E-02	2.31E-03	1.44E-01	1.66E-02	2.39E-03	1.44E-01	1.62E-02	2.33E-03	1.44E-01
^{90}Sr Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
^{137}Cs Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
TRU Alpha Conc. (nCi/g)	6.78E+03	9.91E+02	1.46E-01	7.03E+03	1.03E+03	1.46E-01	6.85E+03	1.00E+03	1.46E-01

ATTACHMENT B.2 REPLICATE TESTING RESULTS FOR GEA-A, CONTAINER 0038035

Instrument: GEA-A
Container: 0038035

Quantity of Interest	Original Measurement		Sample Mean	Sample Standard Deviation	Relative Standard Deviation	χ^2	Pr($x < \|\chi^2\|$)	t	Pr($x < \|t\|$)
	Reported Value	Absolute Uncertainty							
^{233}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!	N/A	N/A
^{234}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!	N/A	N/A
^{238}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!	N/A	N/A
^{238}Pu Activity (Ci)	7.69E-03	1.10E-03	7.26E-03	1.70E-04	2.35E-02	9.54E-02	9.99E-01	2.31E+00	8.17E-02
^{239}Pu Activity (Ci)	1.21E-01	1.74E-02	1.14E-01	2.68E-03	2.35E-02	9.54E-02	9.99E-01	2.31E+00	8.17E-02
^{240}Pu Activity (Ci)	2.77E-02	3.98E-03	2.61E-02	6.14E-04	2.35E-02	9.54E-02	9.99E-01	2.31E+00	8.17E-02
^{242}Pu Activity (Ci)	2.03E-06	2.91E-07	1.91E-06	4.50E-08	2.35E-02	9.54E-02	9.99E-01	2.31E+00	8.17E-02
^{241}Am Activity (Ci)	1.73E-02	2.49E-03	1.63E-02	3.84E-04	2.35E-02	9.54E-02	9.99E-01	2.31E+00	8.17E-02
^{90}Sr Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!	N/A	N/A
^{137}Cs Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!	N/A	N/A
TRU Alpha Conc. (nCi/g)	7.33E+03	1.07E+03	6.92E+03	1.63E+02	2.35E-02	9.25E-02	9.99E-01	2.31E+00	8.17E-02

Quantity of Interest	χ^2 Test	t Test
^{233}U Activity (Ci)	#VALUE!	Not Applicable
^{234}U Activity (Ci)	#VALUE!	Not Applicable
^{238}U Activity (Ci)	#VALUE!	Not Applicable
^{238}Pu Activity (Ci)	Not Significant	Not Significant
^{239}Pu Activity (Ci)	Not Significant	Not Significant
^{240}Pu Activity (Ci)	Not Significant	Not Significant
^{242}Pu Activity (Ci)	Not Significant	Not Significant
^{241}Am Activity (Ci)	Not Significant	Not Significant
^{90}Sr Activity (Ci)	#VALUE!	Not Applicable
^{137}Cs Activity (Ci)	#VALUE!	Not Applicable
TRU Alpha Conc. (nCi/g)	Not Significant	Not Significant

ATTACHMENT B.3 REPLICATE TESTING DATA FOR GEA-B, CONTAINER 3536-8-37

Instrument: **GEA-B**
Container: **3536-8-37**

Quantity of Interest	Original Measurement			Replicate #1			Replicate #2		
	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty
^{233}U Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
^{234}U Activity (Ci)	1.23E-04	2.11E-05	1.71E-01	1.38E-04	2.35E-05	1.71E-01	1.39E-04	2.38E-05	1.71E-01
^{238}U Activity (Ci)	6.58E-05	1.13E-05	1.71E-01	7.35E-05	1.25E-05	1.71E-01	7.44E-05	1.27E-05	1.71E-01
^{238}Pu Activity (Ci)	2.92E-02	5.01E-03	1.71E-01	3.06E-02	5.22E-03	1.71E-01	3.01E-02	5.14E-03	1.71E-01
^{239}Pu Activity (Ci)	2.90E-01	4.97E-02	1.71E-01	3.04E-01	5.19E-02	1.71E-01	2.99E-01	5.11E-02	1.71E-01
^{240}Pu Activity (Ci)	8.14E-02	1.39E-02	1.71E-01	8.53E-02	1.46E-02	1.71E-01	8.39E-02	1.43E-02	1.71E-01
^{242}Pu Activity (Ci)	8.89E-06	1.52E-06	1.71E-01	9.32E-06	1.59E-06	1.71E-01	9.16E-06	1.56E-06	1.71E-01
^{241}Am Activity (Ci)	1.33E-01	2.28E-02	1.71E-01	1.39E-01	2.38E-02	1.71E-01	1.37E-01	2.34E-02	1.71E-01
^{90}Sr Activity (Ci)	2.05E-07	3.51E-08	1.71E-01	3.38E-07	5.77E-08	1.71E-01	3.93E-07	6.70E-08	1.71E-01
^{137}Cs Activity (Ci)	2.25E-07	3.86E-08	1.71E-01	3.72E-07	6.35E-08	1.71E-01	4.32E-07	7.37E-08	1.71E-01
TRU Alpha Conc. (nCi/g)	6.01E+03	1.04E+03	1.74E-01	6.30E+03	1.09E+03	1.73E-01	6.19E+03	1.07E+03	1.73E-01

Quantity of Interest	Replicate #3			Replicate #4			Replicate #5		
	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty
^{233}U Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
^{234}U Activity (Ci)	1.30E-04	2.22E-05	1.71E-01	1.24E-04	2.12E-05	1.71E-01	1.35E-04	2.31E-05	1.71E-01
^{238}U Activity (Ci)	6.96E-05	1.19E-05	1.71E-01	6.62E-05	1.13E-05	1.71E-01	7.20E-05	1.23E-05	1.71E-01
^{238}Pu Activity (Ci)	3.12E-02	5.32E-03	1.71E-01	2.84E-02	4.86E-03	1.71E-01	3.04E-02	5.20E-03	1.71E-01
^{239}Pu Activity (Ci)	3.10E-01	5.28E-02	1.71E-01	2.82E-01	4.83E-02	1.71E-01	3.02E-01	5.16E-02	1.71E-01
^{240}Pu Activity (Ci)	8.68E-02	1.48E-02	1.71E-01	7.92E-02	1.35E-02	1.71E-01	8.46E-02	1.45E-02	1.71E-01
^{242}Pu Activity (Ci)	9.49E-06	1.62E-06	1.71E-01	8.65E-06	1.48E-06	1.71E-01	9.24E-06	1.58E-06	1.71E-01
^{241}Am Activity (Ci)	1.42E-01	2.42E-02	1.71E-01	1.30E-01	2.21E-02	1.71E-01	1.38E-01	2.37E-02	1.71E-01
^{90}Sr Activity (Ci)	2.78E-07	4.75E-08	1.71E-01	< LLD	#VALUE!	#VALUE!	< LLD	#VALUE!	#VALUE!
^{137}Cs Activity (Ci)	3.06E-07	5.22E-08	1.71E-01	< LLD	#VALUE!	#VALUE!	< LLD	#VALUE!	#VALUE!
TRU Alpha Conc. (nCi/g)	6.41E+03	1.11E+03	1.73E-01	5.85E+03	1.01E+03	1.73E-01	6.24E+03	1.08E+03	1.73E-01

ATTACHMENT B.4 REPLICATE TESTING RESULTS FOR GEA-B, CONTAINER 3536-8-37

Instrument: GEA-B
Container: 3536-8-37

Quantity of Interest	Original Measurement		Sample Mean	Sample Standard Deviation	Relative Standard Deviation	χ^2	Pr($x < \|\chi^2\|$)	t	Pr($x < \|t\|$)
	Reported Value	Absolute Uncertainty							
^{233}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!	N/A	N/A
^{234}U Activity (Ci)	1.23E-04	2.11E-05	1.33E-04	6.19E-06	4.65E-02	3.44E-01	9.87E-01	-1.47E+00	2.14E-01
^{238}U Activity (Ci)	6.58E-05	1.13E-05	7.11E-05	3.31E-06	4.65E-02	3.44E-01	9.87E-01	-1.47E+00	2.14E-01
^{238}Pu Activity (Ci)	2.92E-02	5.01E-03	3.01E-02	1.03E-03	3.42E-02	1.69E-01	9.97E-01	-8.21E-01	4.58E-01
^{239}Pu Activity (Ci)	2.90E-01	4.97E-02	2.99E-01	1.02E-02	3.42E-02	1.69E-01	9.97E-01	-8.21E-01	4.58E-01
^{240}Pu Activity (Ci)	8.14E-02	1.39E-02	8.40E-02	2.87E-03	3.42E-02	1.69E-01	9.97E-01	-8.21E-01	4.58E-01
^{242}Pu Activity (Ci)	8.89E-06	1.52E-06	9.17E-06	3.13E-07	3.42E-02	1.69E-01	9.97E-01	-8.21E-01	4.58E-01
^{241}Am Activity (Ci)	1.33E-01	2.28E-02	1.37E-01	4.69E-03	3.42E-02	1.69E-01	9.97E-01	-8.21E-01	4.58E-01
^{90}Sr Activity (Ci)	2.05E-07	3.51E-08	3.36E-07	5.73E-08	1.70E-01	5.34E+00	6.92E-02	-1.99E+00	1.85E-01
^{137}Cs Activity (Ci)	2.25E-07	3.86E-08	3.70E-07	6.30E-08	1.70E-01	5.34E+00	6.92E-02	-1.99E+00	1.85E-01
TRU Alpha Conc. (nCi/g)	6.01E+03	1.04E+03	6.20E+03	2.12E+02	3.42E-02	1.65E-01	9.97E-01	-8.21E-01	4.58E-01

Quantity of Interest	χ^2 Test	t Test
^{233}U Activity (Ci)	#VALUE!	Not Applicable
^{234}U Activity (Ci)	Not Significant	Not Significant
^{238}U Activity (Ci)	Not Significant	Not Significant
^{238}Pu Activity (Ci)	Not Significant	Not Significant
^{239}Pu Activity (Ci)	Not Significant	Not Significant
^{240}Pu Activity (Ci)	Not Significant	Not Significant
^{242}Pu Activity (Ci)	Not Significant	Not Significant
^{241}Am Activity (Ci)	Not Significant	Not Significant
^{90}Sr Activity (Ci)	Not Significant	Not Significant
^{137}Cs Activity (Ci)	Not Significant	Not Significant
TRU Alpha Conc. (nCi/g)	Not Significant	Not Significant

ATTACHMENT B.5 REPLICATE TESTING DATA FOR SHENCA, CONTAINER 0014593

Instrument: **SHENCA**
Container: **0014593**

Quantity of Interest	Original Measurement			Replicate #1			Replicate #2		
	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty
^{233}U Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
^{234}U Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
^{238}U Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
^{238}Pu Activity (Ci)	2.58E-02	4.88E-03	1.89E-01	2.88E-02	3.38E-03	1.17E-01	2.72E-02	5.23E-03	1.92E-01
^{239}Pu Activity (Ci)	6.53E-02	1.06E-02	1.62E-01	7.28E-02	4.80E-03	6.59E-02	6.89E-02	1.14E-02	1.66E-01
^{240}Pu Activity (Ci)	3.40E-02	5.29E-03	1.56E-01	3.79E-02	1.81E-03	4.78E-02	3.58E-02	5.71E-03	1.59E-01
^{242}Pu Activity (Ci)	3.41E-05	1.08E-05	3.17E-01	3.80E-05	1.07E-05	2.80E-01	3.60E-05	1.15E-05	3.19E-01
^{241}Am Activity (Ci)	2.15E-02	3.54E-03	1.65E-01	2.40E-02	1.72E-03	7.17E-02	2.27E-02	3.81E-03	1.68E-01
^{90}Sr Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
^{137}Cs Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
TRU Alpha Conc. (nCi/g)	1.26E+03	2.05E+02	1.63E-01	1.32E+03	9.11E+01	6.87E-02	1.25E+03	2.09E+02	1.67E-01

Quantity of Interest	Replicate #3			Replicate #4			Replicate #5		
	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty
^{233}U Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
^{234}U Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
^{238}U Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
^{238}Pu Activity (Ci)	2.74E-02	5.24E-03	1.91E-01	2.94E-02	3.45E-03	1.17E-01	2.89E-02	3.40E-03	1.17E-01
^{239}Pu Activity (Ci)	6.93E-02	1.14E-02	1.65E-01	7.44E-02	4.88E-03	6.57E-02	7.32E-02	4.82E-03	6.58E-02
^{240}Pu Activity (Ci)	3.60E-02	5.71E-03	1.58E-01	3.87E-02	1.84E-03	4.75E-02	3.81E-02	1.82E-03	4.78E-02
^{242}Pu Activity (Ci)	3.62E-05	1.15E-05	3.18E-01	3.89E-05	1.09E-05	2.80E-01	3.83E-05	1.07E-05	2.80E-01
^{241}Am Activity (Ci)	2.28E-02	3.81E-03	1.67E-01	2.45E-02	1.75E-03	7.15E-02	2.41E-02	1.73E-03	7.16E-02
^{90}Sr Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
^{137}Cs Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
TRU Alpha Conc. (nCi/g)	1.26E+03	2.09E+02	1.66E-01	1.35E+03	9.27E+01	6.85E-02	1.33E+03	9.15E+01	6.87E-02

ATTACHMENT B.6 REPLICATE TESTING RESULTS FOR SHENCA, CONTAINER 0014593

Instrument: **SHENCA**
Container: **0014593**

Quantity of Interest	Original Measurement		Sample Mean	Sample Standard Deviation	Relative Standard Deviation	χ^2	Pr($x < \|\chi^2\|$)	t	Pr($x < \|t\|$)
	Reported Value	Absolute Uncertainty							
^{233}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!	N/A	N/A
^{234}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!	N/A	N/A
^{238}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!	N/A	N/A
^{238}Pu Activity (Ci)	2.58E-02	4.88E-03	2.83E-02	9.80E-04	3.46E-02	1.61E-01	9.97E-01	-2.35E+00	7.88E-02
^{239}Pu Activity (Ci)	6.53E-02	1.06E-02	7.17E-02	2.48E-03	3.46E-02	2.19E-01	9.94E-01	-2.35E+00	7.88E-02
^{240}Pu Activity (Ci)	3.40E-02	5.29E-03	3.73E-02	1.29E-03	3.46E-02	2.38E-01	9.93E-01	-2.35E+00	7.88E-02
^{242}Pu Activity (Ci)	3.41E-05	1.08E-05	3.75E-05	1.30E-06	3.46E-02	5.73E-02	1.00E+00	-2.35E+00	7.87E-02
^{241}Am Activity (Ci)	2.15E-02	3.54E-03	2.36E-02	8.17E-04	3.46E-02	2.13E-01	9.95E-01	-2.35E+00	7.88E-02
^{90}Sr Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!	N/A	N/A
^{137}Cs Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!	N/A	N/A
TRU Alpha Conc. (nCi/g)	1.26E+03	2.05E+02	1.30E+03	4.51E+01	3.46E-02	1.93E-01	9.96E-01	-9.45E-01	3.98E-01

Quantity of Interest	χ^2 Test	t Test
^{233}U Activity (Ci)	#VALUE!	Not Applicable
^{234}U Activity (Ci)	#VALUE!	Not Applicable
^{238}U Activity (Ci)	#VALUE!	Not Applicable
^{238}Pu Activity (Ci)	Not Significant	Not Significant
^{239}Pu Activity (Ci)	Not Significant	Not Significant
^{240}Pu Activity (Ci)	Not Significant	Not Significant
^{242}Pu Activity (Ci)	Not Significant	Not Significant
^{241}Am Activity (Ci)	Not Significant	Not Significant
^{90}Sr Activity (Ci)	#VALUE!	Not Applicable
^{137}Cs Activity (Ci)	#VALUE!	Not Applicable
TRU Alpha Conc. (nCi/g)	Not Significant	Not Significant

ATTACHMENT B.7 REPLICATE TESTING DATA FOR IPAN-A, CONTAINER 22-14

Instrument: **IPAN-A (GEA-A used for isotopic ratios and absolute Cs-137 measurement.)**
Container: **22-14**

Quantity of Interest	Original Measurement			Replicate #1			Replicate #2		
	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty
^{233}U Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
^{234}U Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
^{238}U Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
^{238}Pu Activity (Ci)	1.69E-02	5.75E-03	3.41E-01	1.68E-02	5.73E-03	3.41E-01	1.66E-02	5.65E-03	3.41E-01
^{239}Pu Activity (Ci)	6.62E-02	2.26E-02	3.41E-01	6.61E-02	2.25E-02	3.41E-01	6.52E-02	2.22E-02	3.41E-01
^{240}Pu Activity (Ci)	3.74E-02	1.27E-02	3.41E-01	3.73E-02	1.27E-02	3.41E-01	3.68E-02	1.26E-02	3.41E-01
^{242}Pu Activity (Ci)	1.49E-06	5.09E-07	3.41E-01	1.49E-06	5.08E-07	3.41E-01	1.47E-06	5.01E-07	3.41E-01
^{241}Am Activity (Ci)	8.34E-02	2.84E-02	3.41E-01	8.36E-02	2.85E-02	3.41E-01	8.25E-02	2.81E-02	3.41E-01
^{90}Sr Activity (Ci)	5.65E-03	1.92E-03	3.41E-01	5.63E-03	1.92E-03	3.41E-01	5.66E-03	1.93E-03	3.41E-01
^{137}Cs Activity (Ci)	6.21E-03	2.12E-03	3.41E-01	6.19E-03	2.11E-03	3.41E-01	6.23E-03	2.12E-03	3.41E-01
TRU Alpha Conc. (nCi/g)	1.00E+04	3.87E+03	3.86E-01	9.99E+03	3.86E+03	3.86E-01	9.86E+03	3.81E+03	3.86E-01

Quantity of Interest	Replicate #3			Replicate #4			Replicate #5		
	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty
^{233}U Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
^{234}U Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
^{238}U Activity (Ci)	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	N/A	N/A
^{238}Pu Activity (Ci)	1.66E-02	5.65E-03	3.41E-01	1.65E-02	5.61E-03	3.41E-01	1.65E-02	5.63E-03	3.41E-01
^{239}Pu Activity (Ci)	6.52E-02	2.22E-02	3.41E-01	6.48E-02	2.21E-02	3.41E-01	6.50E-02	2.21E-02	3.41E-01
^{240}Pu Activity (Ci)	3.68E-02	1.25E-02	3.41E-01	3.66E-02	1.25E-02	3.41E-01	3.67E-02	1.25E-02	3.41E-01
^{242}Pu Activity (Ci)	1.47E-06	5.01E-07	3.41E-01	1.46E-06	4.98E-07	3.41E-01	1.47E-06	4.99E-07	3.41E-01
^{241}Am Activity (Ci)	8.24E-02	2.81E-02	3.41E-01	8.19E-02	2.79E-02	3.41E-01	8.22E-02	2.80E-02	3.41E-01
^{90}Sr Activity (Ci)	5.63E-03	1.92E-03	3.41E-01	5.65E-03	1.93E-03	3.41E-01	5.63E-03	1.92E-03	3.41E-01
^{137}Cs Activity (Ci)	6.19E-03	2.11E-03	3.41E-01	6.22E-03	2.12E-03	3.41E-01	6.19E-03	2.11E-03	3.41E-01
TRU Alpha Conc. (nCi/g)	9.85E+03	3.81E+03	3.86E-01	9.79E+03	3.78E+03	3.86E-01	9.83E+03	3.80E+03	3.86E-01

ATTACHMENT B.8 REPLICATE TESTING RESULTS FOR IPAN-A, CONTAINER 22-14

Instrument: IPAN-A
Container: 22-14

Quantity of Interest	Original Measurement		Sample Mean	Sample Standard Deviation	Relative Standard Deviation	χ^2	Pr($x < \|\chi^2\|$)	t	Pr($x < \|t\|$)
	Reported Value	Absolute Uncertainty							
^{233}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!	N/A	N/A
^{234}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!	N/A	N/A
^{238}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!	N/A	N/A
^{238}Pu Activity (Ci)	1.69E-02	5.75E-03	1.66E-02	1.25E-04	7.56E-03	1.90E-03	1.00E+00	2.02E+00	1.13E-01
^{239}Pu Activity (Ci)	6.62E-02	2.26E-02	6.53E-02	4.93E-04	7.56E-03	1.91E-03	1.00E+00	1.82E+00	1.43E-01
^{240}Pu Activity (Ci)	3.74E-02	1.27E-02	3.69E-02	2.79E-04	7.56E-03	1.91E-03	1.00E+00	1.82E+00	1.42E-01
^{242}Pu Activity (Ci)	1.49E-06	5.09E-07	1.47E-06	1.11E-08	7.56E-03	1.91E-03	1.00E+00	1.82E+00	1.43E-01
^{241}Am Activity (Ci)	8.34E-02	2.84E-02	8.25E-02	6.24E-04	7.56E-03	1.93E-03	1.00E+00	1.28E+00	2.71E-01
^{90}Sr Activity (Ci)	5.65E-03	1.92E-03	5.64E-03	1.77E-05	3.14E-03	3.39E-04	1.00E+00	2.81E-01	7.93E-01
^{137}Cs Activity (Ci)	6.21E-03	2.12E-03	6.20E-03	1.95E-05	3.14E-03	3.39E-04	1.00E+00	2.81E-01	7.93E-01
TRU Alpha Conc. (nCi/g)	1.00E+04	3.87E+03	9.86E+03	7.46E+01	7.56E-03	1.48E-03	1.00E+00	1.92E+00	1.28E-01

Quantity of Interest	χ^2 Test	t Test
^{233}U Activity (Ci)	#VALUE!	Not Applicable
^{234}U Activity (Ci)	#VALUE!	Not Applicable
^{238}U Activity (Ci)	#VALUE!	Not Applicable
^{238}Pu Activity (Ci)	Not Significant	Not Significant
^{239}Pu Activity (Ci)	Not Significant	Not Significant
^{240}Pu Activity (Ci)	Not Significant	Not Significant
^{242}Pu Activity (Ci)	Not Significant	Not Significant
^{241}Am Activity (Ci)	Not Significant	Not Significant
^{90}Sr Activity (Ci)	Not Significant	Not Significant
^{137}Cs Activity (Ci)	Not Significant	Not Significant
TRU Alpha Conc. (nCi/g)	Not Significant	Not Significant

ATTACHMENT B.9 REPLICATE TESTING DATA FOR ROOM 172 SGSAS, CONTAINER WIPP-06-12-014

Instrument: **SGSAS**
Container: **WIPP-06-12-014**

Quantity of Interest	Original Measurement			Replicate #1			Replicate #2		
	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty
^{233}U Activity (Ci)	<LLD	#VALUE!	#VALUE!	<LLD	#VALUE!	#VALUE!	<LLD	#VALUE!	#VALUE!
^{234}U Activity (Ci)	<LLD	#VALUE!	#VALUE!	<LLD	#VALUE!	#VALUE!	<LLD	#VALUE!	#VALUE!
^{238}U Activity (Ci)	<LLD	#VALUE!	#VALUE!	<LLD	#VALUE!	#VALUE!	<LLD	#VALUE!	#VALUE!
^{238}Pu Activity (Ci)	1.12E+00	3.59E-02	3.2%	1.13E+00	3.63E-02	3.21E-02	1.14E+00	3.69E-02	3.24E-02
^{239}Pu Activity (Ci)	6.22E+00	1.84E-01	3.0%	6.08E+00	1.80E-01	2.96E-02	6.12E+00	1.81E-01	2.96E-02
^{240}Pu Activity (Ci)	3.81E+00	1.14E-01	3.0%	3.84E+00	1.15E-01	2.99E-02	3.87E+00	1.16E-01	3.00E-02
^{242}Pu Activity (Ci)	1.09E-03	1.14E-04	10.5%	1.20E-03	1.26E-04	1.05E-01	1.21E-03	1.26E-04	1.04E-01
^{241}Am Activity (Ci)	7.19E+00	2.14E-01	3.0%	7.24E+00	2.16E-01	2.98E-02	7.27E+00	2.16E-01	2.97E-02
^{90}Sr Activity (Ci)	<LLD	#VALUE!	#VALUE!	<LLD	#VALUE!	#VALUE!	<LLD	#VALUE!	#VALUE!
^{137}Cs Activity (Ci)	<LLD	#VALUE!	#VALUE!	<LLD	#VALUE!	#VALUE!	<LLD	#VALUE!	#VALUE!
TRU Alpha Conc. (nCi/g)	9.59E+06	1.60E+05	1.7%	9.56E+06	1.60E+05	1.67E-02	9.62E+06	1.61E+05	1.67E-02

Quantity of Interest	Replicate #3			Replicate #4			Replicate #5		
	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty
^{233}U Activity (Ci)	<LLD	#VALUE!	#VALUE!	<LLD	#VALUE!	#VALUE!	<LLD	#VALUE!	#VALUE!
^{234}U Activity (Ci)	<LLD	#VALUE!	#VALUE!	<LLD	#VALUE!	#VALUE!	<LLD	#VALUE!	#VALUE!
^{238}U Activity (Ci)	<LLD	#VALUE!	#VALUE!	<LLD	#VALUE!	#VALUE!	<LLD	#VALUE!	#VALUE!
^{238}Pu Activity (Ci)	1.13E+00	3.64E-02	3.22E-02	1.14E+00	3.72E-02	3.26E-02	1.13E+00	3.67E-02	3.25E-02
^{239}Pu Activity (Ci)	6.12E+00	1.81E-01	2.96E-02	6.11E+00	1.81E-01	2.96E-02	6.15E+00	1.82E-01	2.96E-02
^{240}Pu Activity (Ci)	3.87E+00	1.16E-01	3.00E-02	3.86E+00	1.16E-01	3.01E-02	3.85E+00	1.15E-01	2.99E-02
^{242}Pu Activity (Ci)	1.22E-03	1.27E-04	1.04E-01	1.20E-03	1.26E-04	1.05E-01	1.18E-03	1.23E-04	1.04E-01
^{241}Am Activity (Ci)	7.29E+00	2.17E-01	2.98E-02	7.24E+00	2.16E-01	2.98E-02	7.26E+00	2.16E-01	2.98E-02
^{90}Sr Activity (Ci)	<LLD	#VALUE!	#VALUE!	<LLD	#VALUE!	#VALUE!	<LLD	#VALUE!	#VALUE!
^{137}Cs Activity (Ci)	<LLD	#VALUE!	#VALUE!	<LLD	#VALUE!	#VALUE!	<LLD	#VALUE!	#VALUE!
TRU Alpha Conc. (nCi/g)	9.62E+06	1.61E+05	1.67E-02	9.59E+06	1.60E+05	1.67E-02	9.62E+06	1.61E+05	1.67E-02

ATTACHMENT B.10 REPLICATE TESTING RESULTS FOR ROOM 172 SGSAS, CONTAINER WIPP-06-12-014

Instrument: SGSAS
Container: WIPP-06-12-014

Quantity of Interest	Original Measurement		Sample Mean	Sample Standard Deviation	Relative Standard Deviation	χ^2	Pr($x < \|\chi^2\|$)	t	Pr($x < \|t\|$)
	Reported Value	Absolute Uncertainty							
^{233}U Activity (Ci)	<LLD	#VALUE!	N/A	N/A	N/A	N/A	N/A	N/A	N/A
^{234}U Activity (Ci)	<LLD	#VALUE!	N/A	N/A	N/A	N/A	N/A	N/A	N/A
^{238}U Activity (Ci)	<LLD	#VALUE!	N/A	N/A	N/A	N/A	N/A	N/A	N/A
^{238}Pu Activity (Ci)	1.12E+00	3.59E-02	1.13E+00	5.48E-03	4.83E-03	9.31E-02	9.99E-01	-2.33E+00	8.00E-02
^{239}Pu Activity (Ci)	6.22E+00	1.84E-01	6.12E+00	2.51E-02	4.10E-03	7.44E-02	9.99E-01	3.78E+00	1.94E-02
^{240}Pu Activity (Ci)	3.81E+00	1.14E-01	3.86E+00	1.30E-02	3.38E-03	5.23E-02	1.00E+00	-3.36E+00	2.83E-02
^{242}Pu Activity (Ci)	1.09E-03	1.14E-04	1.20E-03	1.48E-05	1.23E-02	6.77E-02	9.99E-01	-6.89E+00	2.32E-03
^{241}Am Activity (Ci)	7.19E+00	2.14E-01	7.26E+00	2.12E-02	2.92E-03	3.93E-02	1.00E+00	-3.01E+00	3.95E-02
^{90}Sr Activity (Ci)	<LLD	#VALUE!	N/A	N/A	N/A	N/A	N/A	N/A	N/A
^{137}Cs Activity (Ci)	<LLD	#VALUE!	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TRU Alpha Conc. (nCi/g)	9.59E+06	1.60E+05	9.60E+06	2.68E+04	2.79E-03	1.13E-01	9.98E-01	-4.08E-01	7.04E-01

Quantity of Interest	χ^2 Test	t Test
^{233}U Activity (Ci)	Not Applicable	Not Applicable
^{234}U Activity (Ci)	Not Applicable	Not Applicable
^{238}U Activity (Ci)	Not Applicable	Not Applicable
^{238}Pu Activity (Ci)	Not Significant	Not Significant
^{239}Pu Activity (Ci)	Not Significant	Significant
^{240}Pu Activity (Ci)	Not Significant	Significant
^{242}Pu Activity (Ci)	Not Significant	Highly Significant
^{241}Am Activity (Ci)	Not Significant	Significant
^{90}Sr Activity (Ci)	Not Applicable	Not Applicable
^{137}Cs Activity (Ci)	Not Applicable	Not Applicable
TRU Alpha Conc. (nCi/g)	Not Significant	Not Significant

ATTACHMENTS C.1 THROUGH C.8
EPA INSPECTION ISSUE TRACKING FORMS

ATTACHMENT C.1
EPA INSPECTION ISSUE TRACKING FORM, ISSUE NO. HAN-AK-07-001CR FINAL

Inspection No. EPA-HAN-06.07-8	**Issue Number:** HAN-AK-07-001CR Final **Date:** June 6, 2007
Inspector: C. Walker **Attachments?** ☐ YES ☒ NO	**Sample Size:** AK Process Implementation **Population size (if known):** NA

Description of Issue: Acceptable knowledge (AK) information is interpreted by the AK Experts (AKEs), and is transmitted to NDA personnel through waste stream-specific training memoranda, AK document training (e.g., SWITS database), and informal meetings. The process implemented, as determined through interview, is effective and supports AK-NDA personnel communication. There are 7 AKEs and numerous AK data collectors and NDA personnel. Accordingly, the process observed should be formalized by incorporation of a written procedure or instruction which is necessary to cover the numerous individuals involved with the process, as well as to ensure process continuance in the event of personnel changes. Please revise the appropriate procedure(s) to ensure that the framework for the current process is captured.

B. Regulatory Reference: 40 CFR 194.24 mandates that a system of controls be emplaced to ensure that appropriate waste characterization occurs. Implementation of the above is required to ensure that the informal system of controls is in place as required to meet EPA regulations.

C. Site requirement(s): N/A

D. Discussed with: Molly Anderson, Scott Bisping, Rick Dunne, Kent McDonald, Court Fesmire

E. Additional Comments: Site personnel have revised WMP 400 7.1.9 to mandate the preparation of the Training Bulletins and other documents that catalog their NDA-AK communications, and to place these documents in the auditable reference. The reference was prepared and finalized during the inspection, and EPA should be provided a revision of 7.1.9 once completed for EPA records.

F. Site Response Information:

Site Response Required? ☒ YES ☐ NO
Site Response Due Date: Response complete

ATTACHMENT C.2
EPA INSPECTION ISSUE TRACKING FORM, ISSUE NO. HAN-AK-07-002CR FINAL

Inspection No. EPA-HAN-06.07-8	**Issue Number:** HAN-AK-07-002CR Final **Date:** June 6, 2007
Inspector: C. Walker **Attachments?** ☐ YES ☒ NO	**Sample Size:** Waste Streams RLM233SD.001 and RLVIPAC.001 **Population size (if known):** 89 SWBs; 29 SWBs & 159 55-gallon drums

Description of Issue: The AK Documentation Reports HNF-30266 Revision 1 and HNF-29578 present AK information pertaining to the VIPAC and 233SD D&D debris streams. Both documents adequately define the waste streams. However, revisions to the documents are required to clarify questions pertaining to waste material parameter identification, radionuclide composition, general process clarifications, and typographical/editorial improvement. For VIPAC, please make the following revisions to the AK Documentation Report:

- Clarify that the anthropogenic nature of the entire pin/assembly qualifies the pin as a debris item.
- Revise Table 1 to clarify that ceramics, firebrick and other debris material are not expected to be present
- Clarify that PNL was not an independent source of pins to the waste stream
- Add the isotopic distribution for natural uranium to the radionuclide Section 3.6
- Correct references and typographical issues as identified.

For 233SD D&D debris streams, please make the following revisions to the AK Documentation:

- Revise Table 5 to reference the sources for ranges presented
- Revise the text in Section 3.7 to explain the source of information presented on Table 5, including an explanation of how the data were generated or derived, information sources, data limitations, and other relevant changes to better explain the process used to generate the isotopic distribution.
- Revise the text of Section 3.7 to explain why Np237 is not expected even though an Np237 line to the 233-S facility was installed.
- Explain what is meant by a "significant recycle" with respect to uranium in the waste stream
- Assess whether revisions of Table 1 are required because a number of containers have been identified, through RTR, as containing sludges and therefore do not match the SWDR or burial records from which Table 1 values were derived.
- In light of the AK Accuracy of 55% with respect to summary category group identification, prepare an AK Reconciliation Report to address these concerns.
- Correct references and typographical issues as identified.

B. Regulatory Reference: 40 CFR 194.24(c)

C. Site requirement(s): WMP-400 7.1.9

D. Discussed with: Dalena Rollosson, Molly Anderson, Scott Bisping, Dan Arrenholz, Rick Dunne, Kent McDonald, Court Fesmire

E. Additional Comments: Hanford has provided redline strikeout changes to the text for the above document that satisfy the questions raised. No additional information is required, and the site should send the final revised AK Documentation reports for the above waste streams for EPA records once finalized.

Inspection No. EPA-HAN-06.07-8	**Issue Number:** HAN-AK-07-002CR Final **Date:** June 6, 2007
F. Site Response Information: **Site Response Required?** ☒ YES ☐ NO **Site Response Due Date:** Response complete	

ATTACHMENT C.3
EPA INSPECTION ISSUE TRACKING FORM, ISSUE NO. HAN-NDA-07-003CR FINAL

Inspection No. EPA-Hanford-CH-06.08-8	**Issue Number:** HAN-NDA-07-003C Final **Date:** June 6, 2007
Inspector: P. Kelly **Attachments?** ☐ YES ☒ NO	**Sample Size:** SuperHENC Report**;** 2 SuperHENC BDRs **Population size:** NA

Description of Issue: The documentation supporting the SuperHENC contains errors. Specifically:

- Section 4 of HNF-26085, states that the SuperHENC operating procedure TRU-OP-002 "…describes the conditions that require the additional filter…" TRU-OP-002 does not contain this information for the application of steel filters discussed. WRAP NDA personnel stated that the use of the steel filters has not ever been required for a SWB assay on the SuperHENC

- The Radioassay Data Sheets (RDS) for the SuperHENC contain an entry of the sample's Total Alpha Activity expressed in Curies (Ci). The value listed actually presents the sample's total activity, i.e., a sum of the activities in Ci of all alpha, beta and gamma emitting radionuclides listed. WRAP NDA personnel stated that all SuperHENC RDSs contain this error.

B. Regulatory Reference: 40 CFR 194.24(c)

C. Site requirement(s):

D. Discussed with: Naeem Abdurrahman, Karl Husted, Mohamed Elsawi, Brian Anderson, Rick Dunne, Kent McDonald, Court Fesmire

E. Additional Comments:

F. Site Response Information:
Site Response Required? ☐YES ☒NO
Site Response Due Date: NA

ATTACHMENT C.4
EPA INSPECTION ISSUE TRACKING FORM, ISSUE NO. HAN-RTR-07-004CR FINAL

Inspection No. EPA-HAN-06.07-8	**Issue Number:** HAN-07-RTR-004CR Final **Date:** June 6, 2007
Inspector: Dorothy E Gill **Attachments?** ☐ YES ☒ NO	**Sample Size:** 1 **Population size (if known):** 1
Description of Issue: Attachment 4 of procedure WRP1-OP-0909, Revision E, Change 0, provides a calculation equation for liquid in cylinders. The result of this equation is used to assess if an amount of liquid in an SWB meets the criterion for a prohibited item. The procedure does not require the calculation to be documented and it is not available for independent review.	
B. Regulatory Reference: 40 CFR 194.24(c)	
C. Site requirement(s):	
D. Discussed with: Sheila Hailey, John Keve, Rick Dunne, Kent McDonald, Court Fesmire	
E. Additional Comments:	
F. Site Response Information: **Site Response Required?** ☒ YES ☐ NO **Site Response Due Date:** Response complete	

ATTACHMENT C.5
EPA INSPECTION ISSUE TRACKING FORM, ISSUE NO. HAN-VE-07-005CR FINAL

Inspection No. EPA-HAN-06.07-8	**Issue Number:** HAN-VE-07-005CR Final **Date:** June 6, 2007
Inspector: Dorothy E Gill **Attachments?** ☐ YES ☒ NO	**Sample Size:** 1 **Population size (if known):** 1
Description of Issue: Procedure WRP1-OP-0729, Revision C, Change 1, section 5.9.10 requires that at least one replicate weighing be performed per VE event to assess precision. This quality control activity is performed but there are no acceptance limits attached to the replicate weighings. Without acceptance limits to define the weighing precision, the site cannot demonstrate that the required precision has been achieved.	
B. Regulatory Reference: 40 CFR 194.24(c)	
C. Site requirement(s):	
D. Discussed with: Sheila Hailey, Rick Dunn, Kent McDonald, Court Fesmire	
E. Additional Comments:	
F. Site Response Information: **Site Response Required?** ☒ YES ☐ NO **Site Response Due Date:** Response complete	

ATTACHMENT C.6
EPA INSPECTION ISSUE TRACKING FORM, ISSUE NO. HAN-RTR-07-006CR FINAL

Inspection No. EPA-HAN-06.07-8	**Issue Number:** HAN-RTR-07-006CR Final **Date:** June 6, 2007
Inspector: Dorothy E Gill **Attachments?** ☐ YES ☒ NO	**Sample Size:** 1 **Population size (if known):** 1
Description of Issue: All of the contents of the SWB that is used for the biannual capability demonstration for RTR operators are not documented. The SWB does contain the items required by Appendix A of WMP-400, Section 1.2. Revision 20 and those items requested by the site from work record W1-07-00182/0 but the remaining items in the SWB are unknown. Without a comprehensive listing of the SWB's contents EPA was unable to verify that the RTR operators had identified all of the CPR items in the training container. The same situation exists for the RTR Training Drum No. 9903393.	
B. Regulatory Reference: 40 CFR 194.24(c)	
C. Site requirement(s):	
D. Discussed with: Sheila Hailey, John Keve Rick Dunne, Kent McDonald, Court Fesmire	
E. Additional Comments:	
F. Site Response Information: **Site Response Required?** ☒ YES ☐ NO **Site Response Due Date:** Response complete	

ATTACHMENT C.7
EPA INSPECTION ISSUE TRACKING FORM, ISSUE NO. HAN-VET-07-007CR FINAL

Inspection No. EPA-HAN-06.07-8	**Issue Number:** HAN-VET-07-007CR Final **Date:** June 27, 2007
Inspector: Dorothy E Gill **Attachments?** ☐ YES ☒ NO	**Sample Size:** 1 Scale **Population size (if known):** 1 Scale
Description of Issue: Scale No. 840-66-06-010 within the Plutonium Finishing Plant (PFP) at Hanford is used to weigh Standard Waste Boxes (SWBs). This scale is checked before use with items of known weight. However the acceptability of the scale's operation cannot be verified because Work Plan 2Z-05-2127, Attachment A does not provide acceptance ranges for the weights used. As stated, the work plan requires only that the check be performed but is silent regarding the scale's acceptable tolerance	
B. Regulatory Reference: 40 CFR 194.24(c)	
C. Site requirement(s):	
D. Discussed with: Eric Greager, Caroline Sutter	
E. Additional Comments: The weights obtained from this scale are used for the calculation of the weights assigned to Waste Material Parameters (WMP).	
F. Site Response Information: **Site Response Required?** ☒ YES ☐ NO **Site Response Due Date:** 7/13/07	

ATTACHMENT C.8
EPA INSPECTION ISSUES FROM INSPECTION NO. EPA-HANFORD-05.06-08

AK Issues from Inspection No. EPA-Hanford-05.06-08, June 2005[14]

Identification of CH-WAC required Radionuclide Information (Inspection Issue No. HANF-AK-05-007CR): The AK summaries (both detailed summaries and those attached to the WSPFs) for ash waste streams RLFETS.001 and MHASH01 do not address CH-WAC requirements including, but not limited to, identification of the two most prevalent nuclides, isotopic distributions, etc. Almost all of the RFETS and Hanford Ashes have apparently been shipped to WIPP, so revising the AK summary forms attached to the WSPFs for these wastes may not be appropriate at this time. However, the detailed AK summaries for RFETS and Hanford ash must be revised in the future to include CH WAC requirements. The detailed AK Summaries should also be revised to include a more detailed percentage breakdown of WMPs, based on RTR/VE performed. Additionally, the RLFETS.001 AK summary form attached to the WSPF presents scaling factors for $^{234}U/^{235}U$ and $^{234}U/^{238}U$ based on data from Hanford waste tanks, while the RLFETS.001 detailed AK summary (M4T00-DCD-04-468) does not include these factors, and instead presents general isotopic breakdowns based on RFETS information. The correct approach to determining ^{234}U in RFETS ash should be clarified, and the site should ensure that the correct approach was used to calculate ^{235}U if this information was used by measurement personnel. Hanford personnel agreed to implement the above changes and provided an adequate oral response during the onsite inspection.

Resolution: Hanford AK personnel provided calculated factors for ^{235}U and ^{238}U. These factors are 30 for ^{235}U and 2 for ^{238}U. The procedures used for these measurements and calculations are found in the following procedures: ZA-948-385, "NDA Using GeniePC"; FSP-PFP-5.8-16.2, "Data Management for NDA Results"; and ZA-400-302, "Calculation of Assay Results." EPA expects that the AK document will be modified to present the correct measurement and calculation procedures and to provide the ratios used by NDA personnel to calculate ^{234}U activity in the waste from measured ^{235}U and ^{238}U activities.

Status of Concern: EPA considers this issue closed.

Consistency of AK Summaries (Inspection Issue No. HANF-AK-05-008): More than one AK summary had been prepared for the Kerr McGee debris waste stream RLCFFD.001. Hanford personnel prepared an early version initially, followed by a CCP version and then a second Hanford version. However, the latest AK Summary prepared by Hanford and CCP summary had significant differences, particularly with respect to the physical description of the waste through WMC assignment and isotopic information (i.e., identification of the two most prevalent isotopes). The differences have been brought to the attention of the AKE, who reconciled them through creation of AK-AK discrepancies. The AKE adequately addressed resolution of the "two most prevalent isotope" discrepancy through preparation of an AK-AK discrepancy resolution form. The site also provided a Waste Material Code (WMC) analysis which showed that, based on an examination of approximately 30% of the total containers, the waste in the

[14] The Inspection Issue Numbers for the three issues listed above are taken from the EPA report for Inspection No. EPA-Hanford-05.06-08, Docket No. A-98-49, II-A4-58.

aggregate meets the definition of S5420 on the basis of its composition, i.e., approximately 63% inorganic content. However, the site believes that as characterization of the remaining containers continues, future analyses are likely to indicate sufficient variability to render the mathematical determination of the S5420 status as incorrect. Several radiography and other site records were provided to support this determination. At this time, EPA accepts the S5420 designation until a subsequent data examination indicates the current assignment inaccuracies to be incorrect, at which time re-evaluation of WMC assignment would be warranted. EPA expects that all documentation will be compliant with DOE-WIPP-02-3122, specifically regarding that the required actions would betaken with regard to discrepancies between:

> *AK information related to isotopic ratios or composition, the site will evaluate the sources of the discrepancy to determine if the discrepant information is credible. Information that is not credible or information that is limited in its applicability to WIPP characterization will be identified as such and the reasons for dismissing it will be justified in writing [emphasis added]… If discrepancies result in a change to the original determinations, the AK Summary will be updated.*

Resolution: An AK Discrepancy Resolution was prepared in June 2005, which addressed EPA's issue regarding WMC assignment. Hanford stated that data review ultimately resulted in a re-evaluation of the WMC and a reassignment of it as S5490, and waste stream RLCFFDF.001 was approved under this WMC. Therefore, the discrepant information was assessed and changes were appropriately documented.

Status of Concern: EPA considers this issue closed.

AK- NDA Communication (Inspection Issue No. HANF-AK-05-009 CR): Communication between AK and NDA personnel has proved important to ensure that AK data are appropriately used. If AK data have limitations, these should be communicated to NDA personnel who may use isotopic distribution and other information to support measurement activities. In the case of Hanford, NDA personnel may acquire AK information to establish a preliminary understanding of the expected isotopics within a given drum. The NDA procedure WMP-350 Section 2.2, Part 3.3 states that they will acquire such information (WRAP); NDA personnel can do so without communication to the main AK personnel since most of the NDA personnel are trained AK data collectors. NDA personnel described the process by which this AK information was obtained, assessed, and used and the oral description was adequate. However, documented objective evidence (i.e., documentation of activity including original waste information obtained through SWITS, how that information is used, data limitations) was not provided. This is required to ensure adequate implementation of the process described. The process described by NDA personnel was adequate, but objective evidence as to the implementation of the process is required.

Resolution: See Section 8.1, AK (3), discussion of EPA Inspection Issue Tracking Form, Issue No. HNF-AK-07-001CR.

Status of Concern: EPA considers this issue closed.