EPA DOCKET NO. A-98-49, II-A4-87

WASTE CHARACTERIZATION INSPECTION REPORT

EPA BASELINE INSPECTION NO. LANL-CCP-05.06-8
OF THE CENTRAL CHARACTERIZATION PROJECT
WASTE CHARACTERIZATION PROGRAM
AT THE LOS ALAMOS NATIONAL LABORATORY
May 23–25, 2006
WITH FOLLOW UP INSPECTIONS ON
August 22, 2006 and
March 6, 2007

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

March 2007

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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. LANL-CCP-05.06-8 of the Central Characterization Project (CCP) waste characterization (WC) program at the U.S. Department of Energy (DOE) Los Alamos National Laboratory (LANL) in Los Alamos, New Mexico. This inspection occurred on May 23–25, 2006, with a follow-up inspection of the visual examination (VE) process related to the sealed sources program on August 22, 2006. On March 6, 2007, EPA performed an on-site follow-up evaluation at LANL to verify the resolution of all open EPA issues. (See Sections 8.1 and 8.4 for the issues that were outstanding since the May 2006 inspection). 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 its baseline inspection, EPA is proposing to approve the LANL-CCP 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).

During the March 2007 follow-up evaluation, EPA formalized the results of ongoing discussions related to open concerns from the May 2006 inspection. EPA also verified the programmatic changes that were implemented between May 2006 and March 2007 in response to the initial concerns and evaluated the performance of the High-Efficiency Neutron Counter (HENC) #2 nondestructive assay (NDA) system for this time interval. The HENC#2 evaluation included the performance of replicate analyses in accordance with the EPA Replicate Protocol and evaluation of the replicate data.

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 the 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 LANL, most recently in April 2005 (EPA Docket No. A-98-49, II-A4-57). LANL received approval to dispose of debris (S5000), solids (S3000), and Offsite Sealed Source Recovery Program (OSRP)[1] wastes prior to this baseline inspection. The purpose of the LANL-CCP inspections was to evaluate the adequacy of the site's WC programs for two TRU waste categories—debris and solids—to be disposed of at the WIPP; the debris included sealed sources from the OSRP. During the inspections, the Agency examined the following activities:

- Acceptable knowledge (AK) and load management for contact-handled (CH) retrievably-stored TRU debris waste (S5000) and solid waste (S3000) and AK for CH newly-generated, repackaged debris waste from the OSRP
- Visual examination (VE) as a quality control (QC) check of real-time radiography (RTR) and in lieu of RTR for CH retrievably-stored TRU debris waste (S5000) and solid waste (S3000) and Visual Examination Technique (VET) for CH newly-generated, repackaged debris waste from the OSRP
- RTR for CH retrievably-stored TRU debris waste (S5000) and solid waste (S3000)

[1] The OSRP is described in EPA Docket No. A-98-49, II-A4-57.

- Nondestructive assay (NDA), specifically, three NDA systems—LANL HENC #1 and LANL HENC #2 for characterizing debris (S5000) and solid (S3000) waste, respectively, and the portable tomographic gamma scanner (PTGS) for characterizing debris waste (S5000)[2] only
- WIPP Waste Information System (WWIS) for CH retrievably-stored TRU debris waste (S5000) and solid waste (S3000).

The EPA inspection team identified one finding and seven concerns. The one finding in the area of VE and five of the concerns that required a response from DOE, while two concerns did not require a response. EPA Inspection Issue Tracking Forms (see Attachments C.1 through C.8 to this report) document the finding and seven concerns. Personnel from LANL, the Carlsbad Field Office (CBFO), and CCP provided information on resolutions for the finding and concerns to the EPA inspection team prior to the closeout of the onsite inspection and after the inspection. The information provided by CBFO addressed the one finding and the concerns that required a response, as well as the two concerns that did not require a response. Between May 2006 and March 2007, CCP provided satisfactory resolution addressing three concerns while one finding and three concerns remained unresolved. At a follow-up inspection on March 6, 2007, CCP discussed with the EPA inspection team their responses for the four outstanding issues that EPA evaluated for completeness and adequacy, and concluded that each had been resolved satisfactorily. EPA considers the one finding and all concerns to be resolved, and there are no open issues resulting from this inspection.

The EPA inspection team determined that the LANL-CCP WC program activities were technically adequate. EPA is proposing to approve the LANL-CCP WC program in the configuration observed during this inspection and described in this report and the attached checklists (Attachments A.1 through A.8). This proposed approval includes the following:

(1) The AK and load management process for CH retrievably-stored TRU debris and solid wastes and for newly-generated debris wastes from the OSRP

(2) The LANL HENC #1 and LANL HENC #2 NDA systems for assaying solid and debris wastes

(3) The PTGS NDA system for assaying debris waste

(4) VE as a QC check of the RTR process and in lieu of the RTR process for retrievably-stored solid and debris wastes and VET of newly-generated debris wastes from the OSRP

(5) The nondestructive examination process of RTR for retrievably-stored solid and debris wastes

(6) The WWIS process for tracking of waste contents of solid and debris wastes, including debris from the OSRP

LANL-CCP must report and, if applicable, receive EPA approval of any changes to the WC activities from the date of the baseline inspection, according to Table 1, below. Table 1 in this report is not identical to those included in previous baseline inspection reports and EPA site approval letters in several ways. The most important of these involve presentation of the Tier 2

[2] NDA systems are typically not matrix-specific in the same manner as other characterization techniques and their approval is not tied to specific waste matrix categories (i.e., S3000 or S5000). Specifically, virtually any material within the system's matrix calibration range may be assayed.

(T2) elements. In previous reports there were two T2 columns that have been merged into a single T2 column for LANL-CCP. 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.

There are changes to specific WC areas as well. For AK, the AK Reassessment Memoranda (reflecting resolution to concern LANL-CCP-AK-06-001CR) and the AK-VE Memoranda related to VE cited under T2 changes (reflecting resolution to finding LANL-CCP-VE-06-004F) and do not appear in the tiering tables in previous baseline inspection reports. Similarly, requesting revisions to CCP-AK-008 or notification regarding the combination of waste streams that were distinct at the time of inspection are specific to the LANL OSRP or the result of information identified during this inspection. Accordingly, these are absent from the tiering tables in previous baseline inspection reports. For WWIS, changes to specific process elements (e.g., spreadsheets and data fields) are cited as T2 changes and these did not appear in previous tiering tables. These were added to provide a greater degree of specificity in an attempt to identify and focus on the key elements relevant to waste isolation.

EPA will notify the public of the results of its evaluations of proposed Tier 1 (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 before 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 LANL-CCP's T2 changes at the end of the fourth quarter FY2007.

The scope of the site baseline compliance decision is based on EPA's inspections completed on May 25, 2006, and August 22, 2006, and the follow-up evaluation conducted on March 6, 2007.

Table 1. Tiering of TRU WC Processes Implemented by LANL-CCP
Based on May 23–25, 2006 On Site Baseline Inspection, August 22, 2006 OSRP Inspection and March 6, 2007 Evaluation

WC Process Elements	LANL-CCP WC T1 Changes	LANL-CCP WC T2 Changes*
Acceptable Knowledge (AK) and Load Management	Any new waste category, or new OSRP wastes addressed in AK Summaries separate from CCP-AK-008; AK (3), AK (6), AK (16) and (AK) 17 Implementation of Load Management for waste streams other than AK-009; AK (5)	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 Reassessment Memoranda; AK (1) and AK (6) - AK-VE Memoranda related to VE and/or RTR techniques; AK (2) - AK-NDA Memoranda; AK (3) - Site procedures requiring CBFO approval; AK (4) - AK Summary CCP-AK-008, if changed to include newly approved ^{239}Pu and ^{241}Am sealed sources and/or irradiated sources; AK (6) - Combination of waste streams that were distinct at the time of this inspection; AK (6) - Change Notices used to modify and update WSPFs, including additions to waste stream(s) within an approved waste category; AK (9)
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 approvals; RTR (2)
Visual Examination (VE) and Visual Examination Technique (VET), including OSRP Wastes (Sealed Source VET or SSVET)	N/A	Notification to EPA upon the following: - Completion of changes to site VE and VET procedures requiring CBFO approvals, including OSRP VET procedure; VE (1) and SSVET (1)
WIPP Waste Information System (WWIS)	N/A	Notification to EPA upon the following: - Completion of changes to WWIS procedure(s) requiring CBFO approvals; WWIS (1) and WWIS (2) - Changes to the Excel spreadsheet, WWIS data entry summary, characterization and certification; WWIS (1) and WWIS (2)

* Upon receiving EPA approval, LANL-CCP 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.

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)[3] 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).

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.*[4] *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 the waste in such a manner that EPA is confident that the waste will not exceed the approved limits. Before proposing the approval of CCP WC systems and processes at LANL, EPA evaluated the capabilities of systems and processes to (1) identify and measure waste

[3] 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.

[4] 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."

components (such as plutonium) that must be tracked for compliance,[5] 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 LANL-CCP 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. The rule applying to this baseline inspection can be found in the FR (Vol. 69, No. 136, pp. 42571–42583, July 16, 2004).

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. LANL-CCP-05.06-8 in terms of findings and concerns. Specifically, this report does the following:

- Describes the characterization systems 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
- 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

[5] 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 nondestructive assay (NDA) technique that suits such waste to ensure adequate measurements. Radiography and visual examination (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.

The completed checklists (Attachments A.1 through A.7 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 LANL-CCP 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. LANL-CCP-05.06-8 included the technical adequacy of the WC systems in use at LANL-CCP 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 real-time radiography (RTR) and VE for contact-handled (CH) retrievably-stored solid and debris waste, and visual examination technique (VET) for newly-generated debris wastes from the OSRP
- Perform effective waste information (data) transfer using the WIPP Waste Information System (WWIS)

Specifically, these systems consisted of the following components:

- AK and load management processes that support retrievably-stored S3000 solid and S5000 debris wastes, and OSRP (sealed sources) newly generated S5000 wastes.
- Two NDA systems—LANL High-Efficiency Neutron Counter (HENC) #1 and LANL HENC #2, as described in the attachments to this report—for the analysis of CH retrievably-stored S3000 solid and S5000 debris wastes, and one NDA system—portable tomographic gamma scanner (PTGS), as described in the attachments to this report—for the analysis of CH retrievably-stored S5000 debris wastes
- VE as a quality control (QC) check of RTR and in lieu of RTR for retrievably-stored S3000 solid wastes and S5000 debris wastes
- VET of newly-generated S5000 debris waste from the OSRP
- RTR for retrievably-stored S5000 debris and S3000 solid wastes
- The WWIS for the purpose of data transfer for waste containers of all waste matrices 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, LANL-CCP. EPA evaluated the site's WC processes to characterize CH retrievably-stored debris and newly-generated 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 EPA inspectors evaluated to verify compliance included a contribution from all three operating systems, 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 194.24I(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
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 LANL-CCP 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
Mark Pearcy	CCP	AK – SPM, WWIS – SPM
Steve Schafer	CCP	AK – AKE
Julia Whitworth	CCP	AK – AKE
Kevin Peters	CCP	AK – AKE
Randy Fitzgerald	CCP	AK – SPQAO
David Dreher	CCP	NDA – HENC
Joe Wachter	MCS	NDA – PTGS
Joe Harvill	WTS/CCP	NDA – HENC
John Veilleux	LANL	NDA – HENC
Harald Poths	LANL	NDA – PTGS/FRAM
Doug Cramer	MCS	NDA – PTGS
Sean Stanfield	MCS	NDA – HENC
Willie Salazar	LANL	NDA – PTGS/FRAM
Colleen Monk	CCP	RTR – ITS/TS/FQAO & Operator
William Mussman	CCP	RTR – SME/OJT, Operator/ITR/TS/FQAO
Steve Ewing	CCP	VE – SME/OJT, Operator/ITR/TS/FQAO
M. Romero	LANL	VE – SME/OJT, Operator/ITR/TS/FQAO
J. Lopez	LANL	VE – Operator/ITR/TS/FQAO
Ricky Baros	LANL	VE – VEE
Genevieve Fernandez	LANL	VE – VEE
Israel Aragon	CCP	VE – SME/OJT, Operator/ITR/TS/FQAO
Buddy Fussell	CCP	VE & RTR – VPM
Sue Peterman	CCP	VE & RTR – SPM
Davis Christenson	LANL	VE – Operator
John Guadagnoli	CCP	VE – Operator
J.R. Stroble	CCP	WWIS – WCO
Larry Porter	CCP	Program Manager
Courtland Fesmire	CBFO	Observer
Charlie Riggs	CBFO QA Contractor (CTAC)	Observer
Annabelle Axinn	CBFO QA Contractor (CTAC)	Observer

During the baseline inspection, LANL-CCP provided a list of TRU WC personnel from which EPA selected a few 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 LANL-CCP WC personnel responsible for characterizing TRU waste and certifying it as 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

LANL is located approximately 25 miles northwest of Santa Fe, New Mexico, and encompasses an area of 43 square miles. The primary mission of LANL since its creation in the 1940s has been nuclear weapons research and development. Its current mission supports civilian defense and includes large waste management and stockpile stewardship components. In 1998, LANL was the first DOE site authorized by EPA to ship waste to the WIPP. In 2003, CCP assumed responsibilities for CH TRU waste certification activities at the site, and the purpose of this inspection was to determine if the CCP WC program complies with 40 CFR 194.24.

7.2 Inspection Process Overview

EPA Baseline Inspection No. LANL-CCP-05.06-8 took place on May 23–25, 2006. EPA conducted two follow-up inspections on August 22, 2006, and March 6, 2007. The purpose of the August 2006 follow-up inspection was to evaluate the use of VE for sealed sources under the OSRP. During the March 2007 evaluation, EPA inspectors formalized the results of previous discussion with CBFO and CCP personnel regarding open issues from the initial LANL inspection in 2006. EPA inspectors also verified changes made to the HENC #2 NDA system between May 2006 and March 2007, and evaluated the system's performance history over that time, including the evaluation of replicate analyses for two waste containers measured on the HENC #2. EPA performed the inspection in accordance with the scope described in Section 4.0 of this report and for the purpose of determining the site's compliance 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 LANL-CCP 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 LANL-CCP in advance of the inspection

(4) Interacting with CBFO and LANL-CCP 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 LANL-CCP personnel onsite, as appropriate

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

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

8.0 TECHNICAL WASTE CHARACTERIZATION AREAS

Sections 8.1 through 8.6 of this report detail the four technical areas assessed during this inspection—AK and load management; NDA; nondestructive examination, consisting of RTR, VE and VET; and, the WWIS.

8.1 Acceptable Knowledge and Load Management

EPA examined the AK process and load management and associated information to determine whether LANL-CCP demonstrated compliance with 40 CFR 194.8 requirements for CH retrievably-stored solid and debris wastes and newly-generated OSRP 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
- Load management

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 LANL-CCP, 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 procedures and documents related to AK. Documents were provided as paper copies and in electronic format. The list of all documents reviewed is considerable. The list of general documents provided as paper copies is presented first, and most of these were provided as paper copies. These are followed by documents that were provided in conjunction with specific AK reports, i.e., AK-004, AK-006, AK-008 and AK-009, most of which were provided in electronic (PDF) format.

General Reference Documents

- NCR-LANL-0537-05, Revision 0, BDR LA04-HGSAS-LS-012, Drum S845363, Unvented Rigid Liners, July 18, 2005
- E-mail from Dean Mooney to Sheila Pearcy, RE: NCR-LANL-0005-06, Waste Stream Identification Summary Layers of Confinement, May 10, 2006
- LANL-007 NDA memorandum from Steve Shafer to CCP Central Records, Revision 1, Evaluation of the Radiological Characterization of LANL Waste Stream LA-MHD02.01, March 2, 2006
- Interoffice Correspondence, from C. Simmons to CCP Records, RE: Transmittal of Characterization Information Summary for Lot 17 LA-MIN03-NC.001 Waste Stream [LANL-004], March 8, 2006
- Interoffice Correspondence from M. Pearcy to CCP Records, Transmittal of Solids Summary Report for Lot 1 LA-MIN03-NC-001 [LANL-007], August 1, 2005
- Interoffice Correspondence from C. Simmons to CCP Records [LANL-004], March 8, 2006
- NCR-LANL-0742-06, Nonconformance Report (NCR), Container S845150 and CBR LA-RTR2-06-0063, Residual Liquids in Containers, February 23, 2006
- NCR-LANL-0803-05, LA-RTR2-05-0190, Sealed Containers with Greater Than 4 Liters of Liquid, November 15, 2005
- Los Alamos Radioactive Solid Waste Disposal Record for Container S850312 (solid), March 18, 1985

- AK Accuracy Report, LANL Waste Stream LA-MHD01.01, Lots 1-26 (LANL-06), December 20, 2005
- CCP AK Confirmation Checklist, LANL LA-MIN03-NC.001, Homogenous Solid [LANL-04], January 25, 2006
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- C005, Interview: Stanley Kosiewicz Discussing Waste Stream Documentation, Operational history and Hazardous Waste Codes, Jennifer Griffin/Vivian Valencia, TWCP-20848, January 6, 2004, Los Alamos National Laboratory
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Waste Container and Batch Data Reports Reviewed

Waste containers (55-gallon drums) from BDRs for several WC technical areas (VE, RTR, NDA, Head Space Gas [HSG] and Solids) were examined during the inspection. They are listed in Table 4 by container number and the LANL-CCP BDR number and type.

Table 4. BDRs Examined During the Inspection

Container Number	VE BDR No.	RTR BDR No.	NDA BDR No.	HSG BDR No.	Solids BDR No.
850312 (Solids)	N/A	N/A	N/A	N/A	ALD030, 33S, 33V, 25M, 25N
S870375 (07)	LAVE500066	LARTR2-05-0196	LANDA0278	LA06-HGAS-LA-018	N/A
S814218 (solids)	N/A	LARTR2-05-0192	LANDA0257	LA-HGAS-LA/LS-003	N/A
S834538 (Pu-238 debris)	LAVE500066	LARTR2-05-0194	LANDA0287	LA06-HSG-LA/LS016	N/A
S817225 (solids)	LAVE540006	LA-RTR-04-0007	LANDA0072	LA06-HSG-LA/LS006	N/A
54631 HT 83	N/A	LA-RTR-06-0130	2LANDA0004	None listed on PTS/CTS	N/A
55700 Pu-238	N/A	LA-RTR-06-0130	2LANDA0004	LA06-HSG-LS085	N/A
LA00000061432	LA06-OSR-VE-001	Not applicable for OSRP	LA06-OSR-CH-002	Not applicable for OSRP	N/A
LA00000062374	LA06-OSR-VE-001	Not applicable for OSRP	LA06-OSR-CH-002	Not applicable for OSRP	N/A

Technical Evaluation

The EPA inspection team evaluated the adequacy of AK information specific to the CH TRU retrievably-stored debris and solid waste in the following areas:

(1) Data management was evaluated.

LANL-CCP uses the Container Tracking System (CTS) and the Program Tracking System (PTS) to track container status, including NCR status. CCP also uses an uncontrolled AK tracking spreadsheet to track container information that includes container-specific AK material type (MT)[6] data, as well as available isotopic AK information for containers. Numerous LANL databases that provide information to the AK experts (AKEs) for generating AK summaries and populating the AK tracking spreadsheet are available. These databases or log sheets include the following:

- Container waste storage record (CWSR) (1971–87)
- TWSR (1987)
- Discardable waste log sheet (DWLS)

[6] *Material Types* (MTs) are addressed in detail in the Benchmark Environmental Corporation Memorandum dated May 2, 1997 to K. Dziewinska from K. Gruetzmacher. MTs are also relevant to NDA, see Section 8.2.

- CONCERT database
- Nuclear materials management and safeguards system (NMMSS) for OSRP

Based on the information in the AK summaries, it is difficult to ascertain the specific databases and historic log sheets that are available to the AKEs, including ongoing databases that LANL may operate. For future reference, EPA recommends that LANL-CCP include a list of the site databases specific to that waste stream in Chapter 6 of forthcoming AK summaries so that relevant databases are easily identifiable.

(2) AK accuracy was assessed.

LANL-CCP calculates AK accuracy on a lot basis and evaluates WMC changes. LANL-CCP also may discuss inconsistencies with respect to radionuclide data. EPA Checklist Elements 38, 42, and 48 are related to the reassessment of waste if the AK data and related confirmation consistently indicate discrepancies between AK information and measurement data. Up to this point, LANL-CCP had not formally reevaluated waste streams for which NDA data and AK-identified most prevalent nuclides do not comport because only a portion of the waste stream had been measured. Development of criteria for reassessment of AK accuracy based on radionuclide results is important, and EPA recommends that LANL-CCP develop these criteria.

Also, LANL-CCP may assess AK accuracy for radionuclides by comparing the AK and NDA-identified weight percents of the two predominant nuclides. However, the accuracy assessment would be more meaningful if accuracy was also assessed by comparison of the AK and NDA-identified radionuclides based on activity. For example, the March 27, 2006, AK accuracy report for Waste Stream LA-MIN03-NC.001 states that the most prevalent isotopes identified by AK are ^{238}U and ^{235}U, based on weight percent. However, this assignment of ^{238}U and ^{235}U to this waste stream is the result of their presence in a small number of containers. Accordingly, if these few containers are not measured, the radionuclide mass values based on measurement would not match those predicted by AK. Therefore, AK accuracy reports should assess the NDA-AK agreement in identifying the two most prevalent radionuclides by activity as well as by mass. Providing notification to EPA that revised AK Accuracy Reports are available is a Tier 2 change. (See Table 1, where this is included as a T2 change).

The EPA inspection team identified two concerns related to AK-NDA communication. Both concerns were discussed with LANL-CCP AK personnel and EPA included them on EPA Inspection Issue Tracking Forms (See Attachments C.1 and C.2 of this report for copies of these forms) and they are discussed below.

EPA Inspection Issue Tracking Form, Issue No. LANL-CCP-AK-06-001CR: EPA AK Checklist Elements 38, 42 and 48 pertain to the reassessment of waste if the AK data and related confirmation consistently indicate discrepancies between AK and measurement (NDA) based radionuclide values. Up to this point, LANL-CCP has not formally reevaluated waste streams for which NDA data and AK-identified most prevalent radionuclides do not agree because only a portion of the waste stream had been measured. However, CCP should develop processes and criteria to establish when reassessment would occur and what this would entail.

Resolution: In response to the discussions among EPA, CBFO and LANL-CCP personnel, CBFO proposed the following resolution during the follow-up March 6, 2007 inspection:

> *In accordance with the requirements of CCP-QP-005, CCP TRU Nonconforming Item Reporting and Control and CCP-TP-005, CCP Acceptable Knowledge Documentation, CCP has implemented Trend Code L for identifying NCRs that potentially impact AK. NCRs that identify inconsistencies noted during the process of comparing AK information to characterization results and NCRs that identify potential changes to the AK of a waste stream are tracked as Trend Code L. These NCRs are evaluated by the AKE. The AKE evaluation and resolution of the NCR may include preparation of an AK Discrepancy Resolution report, an AK Re-Evaluation, and/or an update to the applicable AK report. Final disposition of Trend Code L NCRs is dependent upon the AKE's evaluation and conclusions regarding actions necessary to close the NCR.*
>
> *Trending of NCRs identified as Trend Code L is performed and reported in the CCP Trend Report, which is prepared semi-annually in accordance with CCP-QP-014, CCP Data Analysis and Trending. If Trend Code L NCRs indicate consistent discrepancies between AK and measurement data, a re-evaluation of AK information will be conducted. CCP does not anticipate any re-evaluation of an entire approved waste stream. If an approved waste stream is eliminated or combined with another approved waste steam, a memorandum written to the AK record will be prepared in accordance to CCP-TP-005, Section 4.3.3, to document the issues, evaluations, and conclusions regarding the waste stream reassignment. In the event an entire waste stream is eliminated or combined with an existing approved waste stream in the future, CCP will provide and document training to characterization personnel regarding changes to the delineation of the waste stream and the content of the memorandum written to the AK record.*

Status of Concern: EPA expects to receive copies of the semi-annual CCP Trend Report that document the application of Trend Code L. EPA accepts the proposed resolution and considers this concern closed.

EPA Inspection Issue Tracking Form, Issue No. LANL-CCP-AK-06-002C: AK accuracy for radionuclides is determined by comparing the AK- and NDA-identified weight percents of the two predominant radionuclides. However, this assessment would be more meaningful if accuracy was also expressed in terms of activity. For example, the March 27, 2006, AK accuracy report for Waste Stream LA-MIN03-NC.001 states that the most prevalent isotopes identified by AK are ^{238}U and ^{235}U, based on weight percent. However, the assignment of ^{235}U and ^{238}U as the most prevalent radionuclides is based on a small number of containers. If these containers are not among those that are measured, the measured versus AK-predicted prevalence by mass would not match. Future AK accuracy reports should also assess the NDA-AK agreement in identifying the two most prevalent radionuclides by activity as well as by mass.

Resolution: This concern did not require a response.

Status of Concern: EPA considers this concern closed.

(3) NDA-AK communication was assessed.

EPA examined the following four waste streams during the inspection, each of which offered different levels of NDA-AK communication.

LA-MIN03-NC.001, TA-50 Homogenous Inorganic Solids Non-cemented Waste (AK-004)

The NDA-AK memorandum for this waste stream indicates that it is essentially a complex radiological mixture, with material input originating from a number of sources (CCP-TP-005, Attachment 7, *Radionuclides, LA-MIN03-NC.001, R0, TA-50 Homogenous Solids, Non-Cemented*, April 29, 2004). Individual waste container isotopic data derived through measurement of that container are not available, although general batch analysis was performed to glean an overall sense of stream contents. A specific isotopic composition or character for this waste was not readily assignable, so the AK memorandum specifically states that default isotopics are not available for this waste stream and only measured data will therefore be reported. Therefore, the NDA operator does not consult the AKE to obtain information beyond what is presented in the AK summary and NDA-AK memorandum.

LA-MHD02.001, ^{238}Pu Contaminated Mixed Heterogeneous Debris (AK-007)

The NDA-AK memorandum indicates that a specific MT—MT 83 (heat source plutonium)—applies to this waste stream. The NDA operator examines the waste, and if there is indication that the isotopics do not match those in the NDA-AK memorandum, the waste is segregated to a different waste stream. Because of the strict definition of this waste stream based on radiological content, little NDA-AK communication is required at this time.

LA-OS-00-01.001, OSRP Sealed Sources (AK-008)

Offsite sealed sources are characterized entirely using AK based on information from various sources, including the NMMSS, source certificates, shipping documents, and manufacturer's shipping records. An AKE assembles all radionuclide information used by the site, which is not used or otherwise verified by NDA. Therefore, NDA-AK communication does not takes place since NDA is not performed.

LA-MHD03.001, CMR Facility Debris (AK-009)

Waste generated from this facility originated from a number of different laboratory areas that managed several different plutonium and uranium MTs (primarily MT 52 and MT 54, followed by MT 83; MT 39 is the primary uranium MT). In addition, traces of other nuclides may be present in the waste. The generators, however, documented the specific MT in each waste container for more than 97% of the individual containers, unlike AK-004. In the case of this stream, operators compare individual assay data against the AK-derived isotopics for the specific container to determine each drum's radiological content. In this case, the AKE-NDA communication is frequent and well documented, as the two disciplines work together to determine the radiological contents of the subject waste stream.

As evidenced by the above, the NDA-AK memoranda for these streams indicate differing levels of NDA-AK interaction, ranging from none because only AK is used, to drum-by-drum coordination. The NDA-AK memoranda have various inconsistencies, as listed below:

- The LANL-004 NDA-AK memorandum includes editorial issues with respect to appropriate units and inadequate referencing of support documents for specific statements or conclusions.
- In the NDA memoranda for LANL-007 and –009, references for formulas or other calculations are lacking.
- Tables in all NDA-AK memoranda are not matched against data in the AK summaries and attachments to ensure consistency; specifically, Table 3 in the LANL-009 NDA-AK memorandum is erroneous and should be revised to indicate expected (rather than suspected) radionuclides, as this affects how site personnel enter the radionuclide values into the WWIS.

AK-NDA Memoranda are a key way to assess communication between these two important technical areas. Accordingly, providing notification to EPA regarding changes made to any AK-NDA document that detail how NDA personnel use AK to identify and quantify radionuclides is a Tier 2 change. (See Table 1, where this is included as a T2 change).

During the inspection, the EPA inspection team noted inconsistencies with the AK- NDA memoranda. This was discussed with LANL-CCP AK personnel and EPA included this 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. LANL-CCP-AK-06-003CR: The NDA-AK memoranda have various inconsistencies that require attention. The LANL-004 NDA-AK memorandum includes editorial issues with respect to appropriate units and inadequate referencing of support documents for specific statements or conclusions. The NDA memoranda for LANL-007 and –009 lack references for formulas and other calculations. Tables in all NDA-AK memoranda should be checked against data in the AK summaries and attachments to ensure that the data presented therein are consistent. Specifically, Table 3 in the LANL-009 NDA-AK memorandum should be revised to indicated expected (rather than suspected) radionuclides, as this makes a difference in how site personnel enter the nuclides into the WWIS.

Resolution: The *NDA* Memorandum is LANL-CCP's method of addressing EPA-identified communication issues and originated when EPA identified these issues at a Hanford-CCP inspection. Some remedies implemented by sites related to TRU WC processes in response to EPA issues or concerns are self imposed, however, these at times may in fact provide assurance that EPA's issues and/or concerns are appropriately identified and rectified. When such AK-NDA memoranda are written they document AK-NDA communication for the purpose of ensuring that both NDA and AK personnel are aware of the use and limitations of AK as applied to NDA. CBFO has stated that, as with any process of improvement, inconsistencies should be corrected when they are found, and LANL-CCP has revised NDA memoranda for waste streams LANL-004, LANL-007 and LANL-009 to address the issues that were identified. EPA is

convinced that when AK NDA communication occurs through the process of using an AK-NDA memorandum it avoids problems that could ultimately result in erroneous data use.

Status of Concern: This concern is closed.

(4) AK procedural adequacy was assessed.

CCP-TP-005, Revision 17, is the most recent AK procedure used by CCP. EPA evaluated this procedure and found it to be adequate. Providing notification to EPA regarding changes made to AK procedures that require CBFO approval is a Tier 2 change. (See Table 1, where this is included as a T2 change).

(5) Load management was examined.

Of the four waste streams EPA examined, CCP indicated that load management was being sought for only one, AK-009, Waste Stream LA-MHD03.001, CMR facility heterogeneous debris waste. The load management estimates showed that between 3–33% of the waste stream is expected to measure less than 100 nCi/g on a container basis. The AKE indicated that the range was assigned because data pertaining to the TRU status of individual drums were not available for about 30% of the containers, so it was assumed that these containers may not measure in the TRU waste range. In reality, site representatives expect that almost all drums from this stream will measure more than 100nCi/g TRU.

LANL-CCP will not use load management for AK-004, AK-008, and AK-007 at this time. If CCP decides to use load management for these waste streams, it must meet the requirements of Appendix E to DOE/WIPP-02-3122, *Contact-Handled Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant (CH-WAC)*, Revision 3, dated April 25, 2005, and notify EPA. Implementation of load management for waste streams other than AK-009 is a Tier 1 change. (See Table 1, where this is included as a T1 change).

(6) The definition of waste stream was evaluated.

EPA assessed each of the four waste streams included in the inspection with respect to whether each was appropriately described and defined. AK-004, homogenous inorganic solids, had been evaluated previously on waste stream determination. AK-007, ^{238}Pu contaminated heterogeneous debris waste, was originally two streams (combustible and noncombustible), which CCP combined because there was an approximately 20-percent error with respect to this WMP. However, note that during the inspection LANL-CCP representatives explicitly defined this waste stream as consisting only of ^{238}Pu debris waste; if ^{239}Pu was detected in drums assigned to this stream, the drums were segregated for inclusion in another waste stream.

When asked whether the ^{239}Pu containers could be placed in AK-006 in the May 2006 inspection, site representatives indicated that this was not an option at that time, apparently due to how the waste streams were assigned. When asked whether the ^{239}Pu containers could be placed in AK-006, site representatives indicated that this was not an option, apparently due to how the waste streams were assigned. Therefore, at the time of the inspection, LANL-CCP had determined that AK-006 and AK-007 are different waste streams based on the definition of waste streams presented in the Waste Analysis Plan (WAP) (NM48901 139088-TSDF, *Waste Isolation*

Pilot Plant Hazardous Waste Facility Permit, 1989) and WAC. EPA agreed that they are separate waste streams based on data available at the May 2006 inspection and following the inspection LANL-CCP representatives reevaluated the waste streams and determined that AK-006 and AK-007 belonged to a single waste stream.

LANL-CCP representatives stated that ^{238}Pu bearing waste was not intentionally generated to create a unique waste stream. Evidence they examined showed that wastes from both the ^{238}Pu and ^{239}Pu lines, which were separate process lines, were commingled at packaging without regard to the original process origin. LANL-CCP representatives stated that post generation, ^{238}Pu-bearing containers were singled out as a separate waste stream, but representatives explicitly stated that the waste generation process did not create two separate streams. Assuming that the information and sources reviewed by LANL-CCP are correct, this conclusion appears valid. However, if data sources show that the waste streams were in fact generated separately, combining the streams would not comport with the definition of waste stream.

Because waste stream combination can greatly impact the radionuclide content, any future combination of different waste streams that were distinct prior to the EPA baseline inspection and are suitable candidates for combining together as a single waste stream will be subject to EPA approval as a Tier 2 change. (See Table 1, where this is included as a T2 change). Also, this change was made because AK data and related confirmation consistently indicated discrepancies that lead to reevaluation of the waste streams as defined. As indicated in EPA Inspection Issue No. LANL-CCP-AK-06-001CR discussed in (3), above, LANL-CCP agreed to prepare a memorandum to document this event whenever this condition occurred, particularly when waste streams previously defined as unique were combined or otherwise significantly modified. EPA requires notification of these memoranda preparation as a Tier 2 change. (See Table 1, where this is included as a T2 change).

Note that the approval of ^{239}Pu and ^{241}Am sealed sources as defense waste makes these wastes eligible for disposal at the WIPP. EPA does not know at this time whether CCP will attempt to include these in the current sealed sources stream, or whether new stream(s) will be defined, but EPA expects any AK summaries dealing with sealed sources to adequately justify the waste stream as defined. Providing AK summaries that include these sources is considered a Tier 2 change. (See Table 1, where this is included as a T2 change). If irradiated OSRP sources are identified, these would most likely require a revised approach to characterization than the current proposed approval for other sealed sources, and accordingly the addition of the OSRP waste is a Tier 1 change. (See Table 1, where this is included as a T1 change).

(7) The use of QuickScan was examined.

LANL-CCP representatives did not specifically address whether RTR using QuickScan was being performed. If so, LANL-CCP should include QuickScan information in the appropriate AK record.

(8) Staff training was examined.

EPA reviewed training records for Julia Whitworth (AKE), Kevin Peters (AKE), Steve Schafer (AKE), Mark Pearcy (site project manager (SPM)), and Randy Fitzgerald (site project quality assurance officer (SPQAO)). These individuals had performed required reading pertinent to

specific procedures and AK summaries associated with the site, as well as applicable WAP and WAC requirements and discrepancy resolution, and nonconformance reporting. However, training was lacking specific to Conditions 2 and 3 of the WIPP compliance certification decision, and there was no record of testing or participation in internal audits. While the individuals were clearly proficient as evidenced through interview, additional EPA-specific training would help ensure consistent understanding of EPA requirements.

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

EPA examined traceability in whole or in part for several containers—S850312 (solids), S870375 (AK-007), S814218 (solids), S834538 (^{238}Pu debris), S817225 (solids), 54631 MT 83, 55700 ^{238}Pu, OSR LA00000061432, and OSR LA00000062374. Information for evaluated containers was traceable from original LANL radioactive solid waste disposal forms or similar forms through the current AK spreadsheet to BDRs generated through WIPP characterization and subsequent tracking in PTS/CTS. EPA did not assess input into the WWIS as part of AK.

WSPFs and related documents were examined. LANL-CCP often uses Change Notices to modify WSPFs and these modifications can significantly alter a waste stream. Accordingly, EPA requires notification regarding the completion of all change notices and related documentation including modified WSPFs, full AK Summaries and AK-NDA communication documentation for each waste stream modified as a T2 change. (See Table 1, where this is included as a T2 change). For all new waste streams EPA requires the following documentation:

- Complete data packages for every waste stream, including the WSPF, AK summaries;
- Characterization Information Summaries relating EPA requirements and other forms; and
- Summaries of radionuclide data for those containers included on the Characterization Information Summary drum list.

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

CCP-TP-005, Attachment 3, presents AK data limitations. This form addresses each source document, and therefore each source document includes a data limitation assessment. LANL-CCP adequately assembles AK information and keys these data to specific AK requirements (CCP-TP-005, Attachments 1 and 4). Attachments 1 and 4 to CCP-TP-005 act as AK "roadmaps" in that they present specific supporting documents and detail the relevancy of those documents to required AK elements.

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

LANL-CCP provided several discrepancy resolutions for EPA's examination. The discrepancy resolutions examined were comprehensive and complete (although this does not necessarily mean that EPA concurred with the resolution therein, for example, combining of waste streams, etc.). LANL-CCP had recently generated a number of discrepancy resolutions specific to the use of the NMMSS database, because the NMMSS database does not comport with other information with respect to sealed source radionuclide content. Tracking of such discrepancies

between the NMMSS database and other sealed sources' radiological content information will be helpful when reassessing the reliability of NMMSS as a primary data source for sealed source radionuclide information (^{239}Pu).

(12) Defense origin of waste was examined.

Each of the four AK summaries examined by EPA presented defense waste information. Up to this point, the shippable portion of the AK-008 OSRP waste stream was limited to ^{239}Pu-related sources that had a clear defense related pedigree. However, on May 1, 2006, CBFO and the Chief Counsel for the TRU waste site approved defense waste determinations for additional waste streams. The waste streams obtaining a defense waste determination were as follows:

- ^{241}Am and ^{238}Pu sealed sources containing radioactive material that were recovered domestically and were stated to have originated from the DOE weapons program
- ^{241}Am, ^{238}Pu, and ^{239}Pu that were stated to be of DOE origin in sources recovered from a foreign country
- ^{241}Am and ^{238}Pu sealed sources that were managed as waste from DOE sites

All three streams are justified in the summaries as being defense waste based on the following argument:

> *Radioactive materials in the sealed sources are [from] activation of decay products of defense materials production, resulting from materials separations during defense nuclear material byproduct management, and are now managed [as defense waste] for defense nuclear materials security and safeguards.*

In essence, the material in the sealed sources is considered to be defense waste because it was created as part of "defense nuclear material byproduct management," even if the sources had a non defense-related application (i.e., referred to as the "born on" justification). EPA did not assess the applicability of this approach. EPA relies on DOE to make the defense determination of such waste streams. These determinations added 560 containers to the pool of containers eligible for shipment to the WIPP and also helped relieve onsite storage and capacity issues at LANL.

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

EPA examined how CCP characterizes and quantifies radionuclides for each of the waste streams to better understand what is obtained through AK and how this information is used to determine the radiological components of the waste.

- LA-MIN03-NC.001, TA-50 Homogenous Inorganic Solids Non-Cemented Waste, AK-004: Default isotopics are not available for this waste stream due to the manner in which the stream was created. Therefore, comparison of measured and AK values to confirm plutonium isotopes cannot be performed. Similarly, while uranium information was tracked in waste from an AK perspective since 1985, the use of "valid AK" to confirm measurements is not appropriate. CCP identified ^{235}U and ^{239}Pu as the two prevalent

isotopes by weight, but CCP did not indicate a specific point at which this assessment would be reconsidered to evaluate this initial determination. Determination of predominant radionuclides by activity rather than weight is more meaningful for the cumulative tracking of the total activity of each of the 10 WIPP-tracking radionuclides measured in the waste.

- LA-MHD02.001, ^{238}Pu Contaminated Mixed Heterogeneous Debris Waste, AK-007: At the time of the inspection, AK defined this waste stream as consisting entirely of MT 83, so the waste's isotopic ratios are well defined. Because NDA personnel know that this waste stream consists of ^{238}Pu, they use these values when determining the specific plutonium contents. It was assumed, therefore, that various measured values would reflect the associated MT 83 ratios. If the measured values did not comport with the known quantity in the waste based on AK, the drums were not part of this waste stream and were segregated for assignment to a new waste stream. Note that post inspection LANL-CCP combined this waste stream with AK-007 because an occasional ^{239}Pu-bearing drum was found in the ^{238}Pu stream, and because CCP believed that the two waste streams were not distinctly and intentionally generated. With respect to uranium, little ^{233}U is anticipated, and it is therefore an "expected" rather than a "suspected" nuclide.

- LA-OS-00-01.001, OSRP Sealed Sources, AK-008: AK is the exclusive means for determining the radionuclide content of sealed sources. For each source, site personnel assess NMMSS, source certificates, fabrication/shipping records, U.S. Nuclear Regulatory Commission registry information, and other data, to determine the radionuclide content of waste at the time of fabrication, which is then corrected for radiological decay and/or ingrowth, as appropriate. Following approval of the defense determinations for ^{241}Pu and ^{241}Am, CCP must update the AK summary to address these sources, including modification to the anticipated prevalent nuclides and other documents (i.e., updating various AK attachments). Note that in addition to sealed sources for which AK has already been assessed, site representatives indicated that additional sources that have been irradiated are available, thus changing the initial composition assigned by the manufacturer. EPA has not examined these sources, nor has the site posed a characterization methodology for these sources. When these sources are brought on line, an updated AK summary, a revised WSPF and radiological characterization protocol using AK will be necessary.

- LA-MHD03.001, CMR Facility Debris, AK-009: Upon waste generation, site personnel assigned each waste container an MT from those that are in the AK record. NDA personnel approach the AKE for specific information on waste containers to assist in NDA measurements. For example, NDA personnel need to know whether MT 83 is present based on AK, and MT 42 (^{242}Pu) mixtures are also important to identify. Sometimes the AKE is required to evaluate information on a drum-by-drum basis and come up with a weighted average by material type(s) so that the NDA personnel understand the potential drum contents by weight percent. Confirmation of plutonium ratios with respect to weapons grade Pu versus heat source Pu (WG Pu versus HS Pu) as described in the WAP apparently does not take place. The CCP AKE indicated that verification might take place on an MT basis. The AKE also indicated that ^{241}Pu was determined by AK as opposed to by calculation based on measured ^{241}Am values, as indicated in the WAC; ^{241}Pu is not a TRU radionuclide and is not one of the 10 WIPP-

tracked radionuclides. The Multi-Group Analysis (MGA) or Fixed-Energy Response Function Analysis with Multiple Efficiencies (FRAM) routines calculate ^{242}Pu as part of the gamma measurement process (see Section 8.2) but site operators often use AK, particularly when AK identifies drums as containing high quantities of ^{242}Pu. With respect to uranium, AK can help to some degree in determining the ^{234}U content on a drum-by-drum basis, and a scaling factor is used to determine the ^{234}U content based on the container's observed ^{235}U and/or ^{238}U content. The AK memorandum states that ^{234}U is quantified by calculation, and it provides the formula and assumptions for the HENCs (LANL HNEC #1 and LANL HENC #2, see Section 8.2) based on various factors, including AK identification of drums containing MT 83, etc.

The EPA inspectors observed inconsistency in radionuclide presentation and reporting. For example, it is important to distinguish radionuclides that are "expected" because this directly impacts how site personnel enter the information for these radionuclides in the WWIS. Specifically, ^{233}U is expected in waste stream LANL-007, and EPA recommends that it be indicated as such in the AK summary.

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

The following issue remained at the end of the previous LANL-CCP inspection, EPA-LANL-CCP-04.05-8, conducted in April 2005 (see Docket No:A-98-49, II-A4-57):

> *AK Concern No. 1.* CCP did not revise the AK summary to address an original concern identified during the April 2005 LANL-CCP inspection. CCP must revise CCP-AK-LANL-06 to "clearly support and justify why a [WMC] cannot be determined even if such a determination can be made on a drum level." Also, the decision to assign the S5400 WMCG to the waste, rather than assign a WMC, is contrary to the requirement in the WAP and affects several aspects of WAP compliance. For example, Section B4-3e of the WAP states, "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 or on obtaining sampling and analysis data will be reported as a measure of acceptable knowledge accuracy." The conscious decision to not assign a WMC code invalidates AK accuracy.

LANL-CCP did not provide CCP-AK-LANL-006, so the EPA inspectors were unable to determine whether a WMC designation had been added. However, WMCs had been assigned to AK-004, AK-007 and AK-009. If these codes are too broadly assigned, the AK accuracy derived from the codes may be of questionable validity because it is unlikely that every drum would require reassignment. EPA recommends that in the future, if CCP seeks to validate reduction of characterization requirements, the specific details on how codes are assigned and whether the assignment(s) are accurate would be fully assessed.

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

AK summaries include general information pertaining to the WMP content of the streams. CCP sometimes calculates WMP content based on individual drum data, if available.

LANL-CCP elected to combine wastes distinguished as combustible and noncombustible debris (e.g., AK-007). Although LANL continues to differentiate wastes by these parameters, LANL-CCP representatives believe that there is a margin of error in these assignments and that it is more appropriate to combine the streams. LANL-CCP typically combines distinguishable waste streams into larger pools to decrease the number of WSPFs needed. In this instance, EPA did not receive information why the sites separated or continue to separate the waste based on these constituents, i.e., why LANL distinguishes two separate waste streams while CCP does not. EPA believes that the LANL waste stream designation is more in line with the regulatory definition, and the combination of waste streams by CCP is mainly for convenience. This is not an issue so long as each container undergoes RTR or VE to determine the WMP content. If CCP relies on AK in the future to modify the characterization requirements for VE, RTR and NDA, a more precise differentiation of wastes based on AK would be required. Reassignment of wastes into separate streams would require consideration to ensure that the uncertainty associated with AK-only WMP assignment is minimized.

AK documents also address some prohibited items, but do not provide specific information as to their specific location or other aspects of those wastes. For example, liquid derived through condensation or dewatering was identified in AK-004, but the anticipated location of this water in the containers was not specified. This turned out to be important, as liquid was identified in the wastes at the bottom and in containers within drums, not just at the top or along the sides of the containers as might be anticipated through condensation/dewatering. Future AK discussions would benefit from more precise statements about the location of prohibited items; if this cannot be ascertained, the AK summaries should state this so that the nondestructive examination staff is better informed.

(16) AK summaries were assessed.

EPA reviewed the following four AK summaries:

- CCP-AK-LANL-004, Central Characterization Project Acceptable Knowledge Summary Report for Los Alamos National Laboratory, TA-50- Radioactive Liquid Waste Treatment Facility, Homogenous Inorganic Solids, Non-Cemented Waste, March 9, 2006
- CCP-AK-LANL-007, Revision 2, Los Alamos National Laboratory Pu-238 Contaminated Mixed Heterogeneous Debris, Waste Stream LA-MHD02.001, April 13, 2006
- CCP-AK-LANL-008, Revision 3, Central Characterization Project Acceptable Knowledge Summary Report for Los Alamos National Laboratory Off-Site Source Recovery Project Sealed Sources, September 22, 2005
- CCP-AK-LANL-009, Central Characterization Project Acceptable Knowledge Summary Report for Los Alamos National Laboratory, Chemical and Metallurgy Research (CMR) Facility, March 9, 2006

The documents were comprehensive and addressed most of the important technical information. EPA requested and examined dozens of supplemental data sources from each of these documents to determine whether the information supported the specific facts referenced in the summaries. These references were sufficient for these purposes. However, to better document CCP's

compliance-related activities, additional modification to the text of some AK summaries is recommended. These modifications will help ensure that the documents are complete and technically accurate. Examples of the recommended changes include the following:

- Remove Wing 1 discussion from Table 10 of LANL-009 and revise the text accordingly
- Include waste stream generation dates in LANL-007 in an appropriate location(s)
- Ensure that all discussion of 10 WIPP-tracked radionuclides as well as any other radionuclides expected are addressed as "expected" rather than "suspected," because this impacts how site personnel enter the data into the WWIS
- Examine WMP and prohibited item discussions to ensure that an accurate description of the wastes is presented. For example, for AK-004, the AK summary indicates that fluids may be present through dewatering and condensation, but it does not indicate specifically where the water may be in the containers
- Clarify the language pertaining to heat source fabrication. AK-007 includes several different current and historic ^{238}Pu waste generation processes, but it is hard to identify which of the processes are active versus those that are not, in large part because the language pertaining to heat source fabrication is confusing.
- Always distinguish "expected" versus "suspected" radionuclides in radiological discussions; it is important to identify "expected" radionuclides as this impacts how site personnel enter radionuclide data into the WWIS (e.g., ^{233}U as presented in AK-007).

This baseline inspection addressed retrievably-stored S3000 solid and S5000 debris wastes, as well as newly-generated S5000 debris wastes. The addition of any wastes(s) not included in this approval is a Tier 1 change. (See Table 1, where this is included as a T1 change).

(17) The OSRP information was reassessed in light of the new defense determinations.

Sealed sources containing ^{241}Am and ^{238}Pu have recently been given a defense determination. LANL-CCP intends to assess whether new waste streams are warranted. If not, LANL-CCP will update the current AK summary with respect to radionuclide content, predominant nuclides, etc.. Similarly, they must update or create a new WSPF to reflect this new approval. Because EPA has not assessed the radiological characterization for new sealed sources, examination of this approach is required to ensure that the processes proposed are technically adequate. As discussed in section (13), above, the addition of sealed sources from new waste streams is a T1 change. (See Table 1, where this is included as a T1 change).

Summary of AK Findings and Concerns

The EPA inspection team did not identify any findings related to AK and identified the concerns that are discussed above. Copies of the EPA Inspection Issue Tracking Forms on which these concerns were documented are provided in Attachments C.1 through C.3 of 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 of the AK and load management systems evaluated during this baseline inspection for CH retrievably-stored debris and solid wastes and newly-generated debris wastes from the OSRP.

Proposed AK Tiers

Based on the inspection and the 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:

- Any new waste category or new OSRP wastes addressed in AK Summaries separate from CCP-AK-008
- Implementation of Load Management for waste streams other than AK-009

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

T2 AK changes do not require prior EPA approval but require LANL-CCP to notify EPA upon implementation of such changes and submit a brief description of the changes. Notification to EPA must be made upon completion of updates to or substantive modifications of the following:

- AK Reassessment Memoranda
- AK-VE Memoranda related to VE and/or RTR techniques
- AK-NDA Memoranda
- Site procedures requiring CBFO approval
- AK Summary CCP-AK-008, if changed to include newly approved ^{239}Pu and ^{241}Am sealed sources and/or irradiated sources
- Completion of AK Accuracy Reports
- Combination of waste streams that were distinct at the time of this inspection.
- Change Notices used to modify and update WSPFs, including additions to waste stream(s) within an approved waste category

Changes to the WC activities from the date of the baseline inspection must be reported to and, if applicable, approved by EPA, according to Table 1. Following EPA approval, LANL-CCP will

provide EPA with information concerning T2 changes at the end of each fiscal quarter. EPA will evaluate these changes and communicate with LANL-CCP as to whether the changes raise any concerns and require a LANL-CCP response, or whether LANL-CCP can continue to implement the changes. Consistent with EPA's authority under 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.

8.2 Nondestructive Assay

WC Element Description

EPA inspected three NDA systems that are used as part of the LANL-CCP WC activities. EPA had previously evaluated and approved two of these systems, LANL HENC #1 (previously called the MCS HENC) and the PTGS. The third system—LANL HENC #2, which LANL-CCP brought online in March 2006—is essentially equivalent to LANL HENC #1 with respect to design, hardware specifications, and assay modes. LANL HENC #1 and LANL HENC #2 follow the same operating procedures, as described below, although the two systems have instrument-specific calibrations and EPA evaluated them as separate measurement systems using separate checklists. See Attachments A.2, A.3, and A.4 to this report for the LANL HENC #1, LANL HENC #2, and PTGS checklists, respectively. Note that the following paragraphs on LANL HENC #1 and the PTGS reference the previous EPA inspection in several places. This is because some elements of these two NDA systems are unchanged since EPA Inspection No. LANL-CCP-04.05-8, conducted in April 2005, and reported in EPA Docket No.A-98-49, II-A4-57. As part of this inspection, EPA reviewed the following elements of the NDA process related to all three systems:

- Capability of the measurement hardware and software to perform the required analyses
- Technical adequacy of the NDA documents and procedures
- Knowledge and understanding of the personnel involved in the NDA program

Additionally, EPA reviewed the performance of the HENC #2 for the time period between the initial inspection in May 2006 and March 6, 2007, at the follow-up inspection, including the replicate measurements in accordance with the EPA Replicate Protocol. The results of this evaluation are presented in sections (5) and (6) of the LANL HENC #2 evaluation, below.

Documents, BDRs, and Waste Containers Reviewed

Attachments A.2, A.3, and A.4 to this report identify the objective evidence that EPA examined for LANL HENC #1, LANL HENC #2, and the PTGS, respectively. The following documents were among those the EPA inspection team examined to assess whether NDA was adequately performed relative to all three measurement systems:

- CCP-PO-002, Revision 11, CCP Waste Certification Plan, February 24, 2005
- CCP-TP-063, Revision 7, CCP Operating the High-Efficiency Neutron Counter Using NDA 2000, March 31, 2006

- CCP-TP-064, Revision 4, CCP Calibrating the High-Efficiency Neutron Counter Using NDA 2000, March 31, 2006
- CCP-TP-103, Revision 6, CCP Data Reviewing, Validating and Reporting Procedure for the High-Efficiency Neutron Counter Using NDA 2000, February 28, 2006
- CCP-TP-123, Revision 2, CCP Calibrating the Tomographic Gamma Scanning System, September 21, 2005
- CCP-TP-124, Revision 2, CCP Determining Isotopic Ratios in Waste Containers Using the PC/FRAM Assay System, October 31, 2005
- CCP-TP-125, Revision 2, Verification and Validation of FRAM and PTGS Nondestructive Assay Data Using a Manual Review Method, July 5, 2005
- CCP-TP-126, Revision 4, CCP Waste Assay Using the Portable Tomographic Gamma Scanner, September 8, 2005
- Canberra Report: Energy Calibration and Verification Report, Revision 0, S. Stanfield and B. Gillespie, October 2005 (HENC #1)
- Canberra Report: Energy Calibration and Verification Report, Revision 1, S. Stanfield and J. Wachter, May 2006 (HENC #1)
- MCS HENC#2 Calibration Verification, Revision 0, Sean Stanfield, July 21, 2006
- MCS HENC#2 Calibration Verification, Revision 0, Sean Stanfield, September 12, 2006
- LANL HENC (HENC#2) Calibration Verification, Revision 0, Sean Stanfield, December 14, 2006
- MCS HENC#2 Calibration Verification, Revision 0, Sheri Chambers, January 25, 2007
- MCS HENC#2 Calibration Verification, Revision 0, Sheri Chambers, January 29, 2007
- MCS HENC#2 Calibration Verification, Revision 0, Sheri Chambers, January 29, 2007
- HENC#2 Calibration Verification, Revision 0, Sheri Chambers, March 5, 2007
- MCS-HENC1-NDA-1001, Revision 2, Calibration Report for the MCS HENC #1 Including Passive Neutron Calibration Verification and Gamma Spectrometer Calibration and Conformation, April 28, 2004
- MCS-HENC1-NDA-1002, Revision 2, Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Conformation, April 4, 2005
- MCS-HENC1-NDA-1002, Revision 3, Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Conformation, April 13, 2005
- MCS-HENC1-NDA-1002, Revision 4, Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Conformation, December 14, 2005

- HENC #2-NDA-1002, Revision 0, Calibration Report for the HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Conformation, March 28, 2006
- CI-HENC-TMU-101, Revision 1, Total Measurement Uncertainty for the MCS HENC #1 with Integral Gamma Spectrometer, March 23, 2005
- LANL-HENC2-TMU-101, Revision 0, Total Measurement Uncertainty for the HENC #2 with Integral Gamma Spectrometer, April 10, 2006
- MCS HENC Calibration Verification, Sean Stanfield: September 14, 2005; April 22, 2006; April 30, 2006; and Revision 1, May 3, 2006
- RRES-CH:03-058, Lower Limit of Detection for the LANL Portable Tomographic Gamma Scanner (PTGS), March 15, 2005
- NWIS-TP: 2005-01102, Revision to TWCP-23398, Total Measurement Uncertainty for the Portable Tomographic Gamma Scanner (PTGS), March 30, 2005
- Weekly Interfering Matrix Check Results for the LANL PTGS and FRAM, October 1, 2005, to March 31, 2006
- Weekly Interfering Matrix Results, LANL MCS HENC #1, October 1, 2005, to March 31, 2006
- Weekly Interfering Matrix Results, LANL MSC HENC (HENC #1, April 1, 2005, to September 30, 2005
- HENC #1BDR LANDA0361—10 containers
- HENC #1 BDR LANDA0124—10 containers
- HENC #1 BDR LANDA0227—11 containers
- HENC #1BDR LANDA0390—11 containers
- HENC #2 BDR 2LANDA0002—five containers
- HENC #2 BDR 2LANDA0005—nine containers
- HENC #2 BDR 2LANDA0006—five containers
- HENC #2 BDR 2LANDA0010—seven containers
- BDR LA05-PTGS-027—eight containers
- BDR LA05-PTGS-042—nine containers
- BDR LA05-PTGS-057—five containers
- BDR LA05-PTGS-092—six containers

Technical Evaluation: LANL HENC #1

(1) The design and operational history of LANL HENC #1 was assessed.

LANL HENC #1 is located on Pad 10 in Area G of TA-54, in the same location as when EPA last inspected it in April 2005. The system incorporates two measurement modalities—a passive neutron counter and an integral gamma-ray spectrometer. The passive neutron counter uses multiple ^{3}He proportional counters, along with a multiplicity shift register and an external ^{252}Cf source for the Add-a-Source matrix correction function, to determine the spontaneously fissioning mass content of waste containers, referred to as the $^{240}Pu_{Effective}$ ($^{240}Pu_{Eff}$). The $^{240}Pu_{Eff}$ is defined as the amount of ^{240}Pu that would produce the observed true coincidence rate, after correcting for the neutron moderation properties of the waste matrix. The quantities of individual radionuclides are related to the $^{240}Pu_{Eff}$ by applying the ratios of other TRU or target radionuclides, including all spontaneously fissioning radionuclides (i.e., ^{235}U). In LANL HENC #1, these (isotopic) ratios are routinely determined by Multi Group Analysis (MGA) of the gamma-ray spectrum based on measurement data obtained with the integral gamma-ray spectrometer, as discussed below.

The integral gamma-ray spectrometer is a high-purity germanium (HPGe) detector used to acquire the gamma-ray spectrum to be analyzed by MGA and 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. The spectrometer used a multicurve efficiency calibration based on the waste density to correct for photon attenuation inside the drum.

The use of a different NDA system not observed during this inspection or physical modifications to the HENC#1 described above is a T1 change (see Table 1 where this is included as a T1 change).

(2) The passive neutron and gamma calibrations of LANL HENC #1 had been performed as required.

The original calibration of LANL HENC #1 for its use in the WIPP program took place at Canberra Industries in Meriden, Connecticut. This calibration was initially verified when the system became operational at LANL in 2004 and both the initial calibration and subsequent verification were evaluated by EPA during Inspection No. LANL-CCP-04.05-8. An additional report, MCS-HENC1-NDA-1002, *Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 2, dated April 4, 2005, addressed changes to gamma efficiency calibration that were indicated by the system's performance in the CBFO-sponsored NDA performance demonstration program (PDP). The main change was the removal of the sludge drum calibration because the calibration sources extended above the matrix, resulting in an unacceptable bias, in addition to incorporating cadmium filters to reduce dead time originating from higher concentrations of ^{241}Am normally associated with aged plutonium. The calibration was verified as documented in the supplemental calibration report from 2005. The calibration was applicable to S3000 homogenous solid wastes and S5000 debris wastes packaged in 55-gallon drums, with or without polyethylene liners. The passive neutron calibration performed originally in November 1997 was verified in March 2004 and again in 2005 at LANL using combinations of plutonium oxide (PuO_2) sources totaling approximately 0.599, 15.0, and 160 grams of total plutonium in a non-interfering matrix. The

upper end of the passive neutron's original calibrated range, which was the lower limit of detection (LLD) to 100 g plutonium (6.55 g $^{240}Pu_{Eff}$), was extended to 177 g plutonium total (12.159 g $^{240}Pu_{Eff}$) for both solid and debris wastes. LANL-CCP personnel stated that they will use this system to assay wastes containing weapons-grade plutonium (WG Pu) and heat source plutonium (HS Pu), which are predominantly ^{239}Pu and ^{238}Pu, respectively. Both WG Pu and HS Pu are correlated to a variety of MTs that were discussed in Section 8.1 of this report. The passive neutron calibration for LANL HENC # 1 was technically adequate and appropriately documented.

The integral gamma-ray spectrometer was originally calibrated in March 2004 using six $^{241}Am/^{152}Eu$ line sources in five surrogate waste drums with waste matrix densities of 0.018, 0.49, 0.69, 1.24, and 1.64 g/cm^3. For each of the surrogate waste drums, the efficiency of the detector was measured as a function of gamma-ray energy between 59 and 1,408 keV. Note that the energy calibration for LANL HENC #1 differs slightly from what was established for LANL HENC #2, discussed later in this section. The calibration of the integral gamma-ray spectrometer was confirmed using the same WG Pu sources used to verify the passive neutron calibration. This is still the calibration of record, although the efficiency calibration was changed and verified as required (as documented in MCS-HENC1-NDA-1002, Revision 2, dated April 4, 2005). The gamma calibration is not a mass calibration in the strict sense, although the calibration/qualification summary in the supplemental calibration report states an operating range of LLD to 175 g plutonium, which is more representative of the passive neutron component. Like other gamma systems, there is no strict upper mass limit, provided all operational parameters, such as dead time and resolution (peak shape), are met. The gamma calibration for LANL HENC #1 was technically adequate and appropriately documented.

The extension of or changes to the stated calibration neutron and/or gamma range(s) for the HENC#1 is a Tier 1 change (see Table 1 where this is included as a T1 change).

Changes to the software or operating range(s) of the HENC#1, and to the site procedures that govern its use that require CBFO approval are T2 changes (see Table 1 that includes these as T2 changes).

(3) The total measurement uncertainty (TMU) of assays performed on LANL HENC #1 had been determined and documented.

CI-HENC-TMU-101, *Total Measurement Uncertainty for the MCS HENC #1 with Integral Gamma Spectrometer*, Revision 2, dated April 28, 2004, documents the original determination of the TMU for LANL HENC #1. This had been modified by changing the second paragraph of Section 4.1.4, on page 17, regarding a previously identified issue related to drum fill height that CI-HENC-TMU-101 (Revision 1, dated March 23, 2005) also documented. Among the components of uncertainty included in the TMU determination for the passive neutron measurement were contributions from the calibration uncertainty; calibration counting statistics; matrix and source distribution effects; background effects for high atomic number waste matrices; and uncertainties due to isotopics, chemical forms, and neutron multiplication. The TMU determination for the passive neutron component of this system was unchanged since the last EPA inspection in April 2005. For the integral gamma-ray spectrometer, the TMU evaluation included counting statistics, background fluctuations, interferences from other gamma-emitting radionuclides, calibration uncertainties, matrix non-homogeneities, non-uniform

source distributions, isotopic measurement uncertainties, and effects from self-absorption. The TMU determination for the gamma component of this system was unchanged since the last EPA inspection in April 2005. LANL-CCP adequately determined and documented the TMU for both operational modes for LANL HENC #1.

(4) The LLD, including the minimum detectable concentration (MDC) of LANL HENC #1, had been determined and documented.

CCP-PO-002, *CCP Transuranic Waste Certification Plan*, Revision 11, defined LLD 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 (passive neutron or gamma), the properties of the waste matrix being assayed, the data acquisition (measurement) time, and the environmental background. For this reason, the LLD is expected to vary from drum to drum and also may vary between measurements of the same drum. The NDA 2000 software estimated and reported the LLD of each of the 10 WIPP-tracked radionuclides for each measurement. Only values that exceeded the reported LLD for that measurement were to be reported and were used in calculations of derived quantities, such as total TRU alpha activity and TRU alpha activity concentration. LANL-HENC1-NDA-1002, Revision 2, included the average LLD for each of the WIPP-tracked radionuclides estimated for two surrogate drums containing 38.3 kg of debris waste and 227 kg of homogenous waste. These values were typical of the waste drums to be assayed on LANL HENC #1. The LLD of LANL HENC #1 was technically adequate and appropriately documented.

(5) EPA coordinated and evaluated replicate testing of LANL HENC #1.

The purpose of the replicate testing during this inspection was to provide EPA with an independent means to verify that LANL HENC #1 could provide consistent, reproducible results for determining the quantity of 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) and the TRU alpha concentration. This was accomplished by reassaying drums previously characterized on the same system or instrument in order to evaluate its ability to do the following:

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

As part of the inspection to certify LANL HENC #1, EPA requested that LANL reassay a group of waste drums that EPA randomly selected from a list of drums previously assayed on the HENC that was provided by LANL-CCP. The three drums selected were Containers 52331, 52476, and 53093. At EPA's request, site personnel reassayed each of these drums five times for

this inspection. Two statistical tests, a chi squared (χ^2) test and a *t* test, were performed for the replicate analyses on each container. Attachments B.1 through B.6 to this report include analytical data for each assay event and the results of the statistical analysis.

For all three drums the *t* test showed no statistically significant differences between the original measurement assay values and the average of the five replicate measurements for all measured parameters. The χ^2 tests for these same three containers showed a highly significant flag only for ^{242}Pu. This indicates that the variances in the replicate measurements for ^{242}Pu were greater than the reported uncertainties for all values relative to the limits of the test. For all three containers this appears to be an artifact of the statistical evaluation. Specifically, the spread of values is so tight that the test effectively places an inordinate emphasis on small variations, resulting in a penalty for high precision. EPA has previously observed and reported this phenomenon during inspections at other TRU WC sites. An evaluation of the ^{242}Pu data outside of the χ^2 test indicates that there is no real measurement issue. Although the software identified these variances as "highly significant," this does not indicate a measurement issue that warrants additional attention at this time. There is no technical issue relative to the highly significant flags for the ^{242}Pu values on the χ^2 test for the LANL HENC #1 replicates.

The *t* test for all three containers showed only statistically significant differences between the original measurement assay values and the average of the five replicate measurements for the activities of all measurement parameters. There is no technical issue relative to the *t* test values for the LANL HENC #1 replicates.

Technical Evaluation: LANL HENC #2

(1) The design and operational history of LANL HENC #2 was assessed.

LANL HENC #2 is located on Pad 10 in Area G of TA-54, in building TA-54-B498, adjacent to the location of LANL HENC #1, discussed above. The system functions in the same manner as LANL HENC #1 in that it incorporates two measurement modalities—a passive neutron counter and an integral gamma-ray spectrometer. The passive neutron counter uses 113 ^{3}He proportional counters arranged in a 4π geometry, in conjunction with a multiplicity shift register and an external ^{252}Cf source for the Add-a-Source matrix correction. This combination quantifies the spontaneously fissioning content of waste containers, referred to as the $^{240}Pu_{Eff}$, described above As was observed for the LANL HENC#1, the quantities of individual radionuclides are related to the $^{240}Pu_{Eff}$ by applying the ratios of other TRU or target radionuclides, including all spontaneously fissioning radionuclides (i.e., ^{235}U). In the LANL HENC #2, the isotopic ratios are routinely determined by MGA of the gamma-ray spectrum based on data obtained with the integral gamma-ray spectrometer, as discussed below.

The integral gamma-ray spectrometer is an HPGe detector used to acquire the gamma-ray spectrum to be analyzed by MGA and 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. The spectrometer used a multicurve efficiency calibration based on the waste density to correct for photon attenuation inside the drum.

The use of a different NDA system not observed during this inspection or physical modifications to the HENC#2 described above is a T1 change (see Table 1 where this is included as a T1 change).

Changes to the software or operating range(s) of the HENC#2, and to the site procedures that govern its use that require CBFO approval are T2 changes (see Table 1 that includes these as T2 changes).

(2) The passive neutron and gamma calibrations of the LANL HENC #2 had been performed and confirmed as required.

The original calibration of the LANL HENC #2 was performed in 1999; however, the system was recalibrated at LANL for use in the WIPP program beginning in February 2006. HENC#2-NDA-1002 (also numbered as P2010-1516), *Calibration Report for the HENC#2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0, documents the calibration. The calibration is applicable to S3000 homogenous solid wastes and S5000 debris wastes packaged in 55-gallon drums, with or without polyethylene liners. The calibration range of the passive neutron system is stated as the LLD to 177 g plutonium (16.29 g $^{240}Pu_{Eff}$), and HENC#2-NDA-1002 includes documentation of a calibration confirmation using predominantly ^{238}Pu material.

The integral gamma-ray spectrometer was originally calibrated in February 2006 using six $^{241}Am/^{152}Eu$ line sources in five surrogate waste drums with waste matrix densities of 0.018, 0.49, 0.69, 1.24, and 1.64 g/cm^3. For each of the surrogate waste drums, the efficiency of the detector was measured as a function of gamma-ray energy between 50 and 1,228 keV. This energy range differs slightly from the range stated for LANL HENC #1, which is listed as 59 to 1408 keV. According to LANL-CCP personnel, the functional range of the gamma component's operational range for LANL HENC #2 is slightly greater than 100 keV due to attenuation of the Sn/Cu filters that were installed to prevent excessive dead-time corrections from high concentrations of ^{241}Am. The calibration of the integral gamma-ray spectrometer was confirmed using the same WG Pu sources that were used to verify the passive neutron calibration. The gamma calibration is not a mass calibration in the strict sense, although the calibration and qualification summary in HENC#2-NDA-1002 states a gamma operating range of LLD to 217 g total plutonium, which is limited by dead time. Like other gamma systems, there is no strict upper mass limit, provided all operational parameters, such as dead time and resolution (peak shape), are met. EPA found that the passive neutron and gamma calibrations for LANL HENC #2 were technically adequate and appropriately documented.

The extension of or changes to the stated calibration neutron and/or gamma range(s) for the HENC#2 is a Tier 1 change (see Table 1 where this is included as a T1 change.)

(3) The TMU of assays performed on LANL HENC#2 had been determined and documented.

LANL-HENC2-TMU-101, *Total Measurement Uncertainty for the HENC #2 with Integral Gamma Spectrometer*, Revision 0, dated April 10, 2006, documents the original determination of the TMU for LANL HENC #2. Among the components of uncertainty included in the TMU determination for the passive neutron measurement were contributions from the calibration uncertainty; calibration counting statistics; matrix and source distribution effects; background

effects for high atomic number waste matrices; and uncertainties due to isotopics, chemical forms, and neutron multiplication. For the integral gamma-ray spectrometer, the TMU evaluation included counting statistics, background fluctuations, interferences from other gamma-emitting radionuclides, calibration uncertainties, matrix non-homogeneities, non-uniform source distributions, isotopic measurement uncertainties, and effects from self-absorption. The approaches to TMU determination for the passive neutron and gamma components are essentially the same as those used for the LANL HENC #1, discussed above. The TMU determination for both operational modes was technically adequate and appropriately documented for the LANL HENC #2.

(4) The LLD, including the MDC of the LANL HENC #2, had been determined and documented.

CCP-PO-002, *CCP Transuranic Waste Certification Plan*, Revision 11, defined LLD 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 (passive neutron or gamma), the properties of the waste matrix being assayed, the data acquisition (measurement) time, and the environmental background. For this reason, the LLD is expected to vary from drum to drum and also may vary between measurements of the same drum. The NDA 2000 software estimated and reported the LLD of each of the 10 WIPP-tracked radionuclides for each measurement. Only measured values that exceeded the reported LLD for that measurement were to be reported and were used in calculations of derived quantities, such as total TRU alpha activity and TRU alpha activity concentration. The average passive neutron and gamma LLDs for each of the WIPP-tracked radionuclides estimated for two surrogate drums containing 38.3 kg of debris waste and 191.7 kg of homogenous waste were included in HENC#2-NDA-1002, Revision 0, page 12, Tables 8a and 8b, respectively. These values are representative of waste drums to be assayed on LANL HENC #2. EPA found the LLD determination for LANL HENC #2 to be technically adequate and appropriately documented.

(5) EPA evaluated the performance of the LANL HENC #2 for the time period between May 25, 2006, and March 6, 2007.

There were 7calibration verifications performed between May 25, 2006, and March 6, 2007, and each was documented. The verifications were required for the typical types of measurement issues expected during routine operations, e.g., exceeding a 3 σ Control Limit on the daily ^{152}Eu source check. The complete list of the documentation for each verification that was reviewed on March 6, 2007 is provided above. All calibration verifications were acceptable. The dates on which the verifications were documented[7] and a summary of each are as provided below:

[7] The actual date of the measurement event that prompted the calibration verification is not necessarily the same as the date of the calibration verification report. The actual date of the measurement event is documented in the calibration report in all cases.

- July 21, 2006 – 3 σ failure on the ^{152}Eu source
- September 12, 2006 – 3 σ failure on the K normalization
- December 14, 2006 – 3 σ failure on the Full-Width-at-Half-Maximum (FWHM) on the ^{152}Eu 122 keV line
- January 25, 2007 – computer failure
- January 28, 2007 – 3 σ failure on the ^{152}Eu source
- January 29, 2007 – 3 σ failure on the ^{152}Eu source
- March 5, 2007 – 3 σ failure on the FWHM on the ^{152}Eu 122 keV line

A source check was performed using a combination of PDP-type Pu sources configured in a matrix drum and each source check was evaluated for accuracy (Relative Percent Accuracy or RPA) and precision (Relative Standard Deviation or RSD) using the criteria in DOE-WIPP-02-3122. All checks were acceptable and were documented appropriately. The EPA inspection team observed the assay of the Weekly Interfering Matrix using PDP Matrix Drum No. 003 that was loaded with the RANT 50-1, RANT 50-2, RANT 50-3 and NTP-0164 WG Pu sources in specified positions (height and distance from drum center), as required. The total Pu loading of the drum was approximately 215 g. The LANL HENC#2 operational logbook (logbook No. LANL-NDA-HENC-02-003) that was observed in use in the LANL HENC #2 trailer had been appropriately completed and contained documentation of the activities observed during this inspection.

It was noted that containers assayed on the LANL HENC #2 were marked with a blue adhesive label that stated *VPM ADMINISTRATIVE HOLD, EQUPIMENT NOT CERTIFIED*, reflecting the system's regulatory status, i.e., uncertified at the time of this inspection. A sample of this label was provided and the EPA inspection team observed actual waste drums that had been assayed on the LANL HENC #2.

Following the May 2006 inspection, LANL-CCP initiated a Corrective Action Plan (CAP) in response to the CBFO Corrective Action Report CAR-LANL-0007-06, Revision 0 related to a measurement failure during Cycle 13A of the CBFO sponsored NDA Performance Demonstration Program (PDP). Specifically, the LANL HENC #1, LANL HENC #2, and the PTGS had failed the accuracy criterion on the NDA PDP Glass Matrix Drum containing HS Pu. The CAP proposed changing the analysis routine such that it operated in the *count-to-precision mode* as opposed to operating for a preset time. This allowed the NDA systems to continue the assay until sufficient counts were obtained irrespective of the measurement time as opposed to assaying for a preset time. This approach was successful for both LANL HENC units but was not successful for the PTGS. As of January 2007, the following CBFO approvals are in effect:

- LANL HENC #1 – approved for WG Pu and HS Pu in all matrices
- LANL HENC #2 – approved for WG Pu and HS Pu in all matrices
- PTGS – approved for WG Pu in matrices as described below, and not approved for HS Pu in any matrix

There are no open issues related to the LANL-CCP CAP.

(6) EPA coordinated and evaluated replicate testing of LANL HENC #2.

The purpose of the replicate testing during this inspection was to provide EPA with an independent means to verify that LANL HENC #1 could provide consistent, reproducible results for determining the quantity of 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) and the TRU alpha concentration. To accomplish this, LANL-CCP reassayed drums previously characterized on the same system or instrument in order to evaluate its ability to do the following:

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

As part of the inspection to certify LANL HENC #2, EPA requested that LANL reassay a group of waste drums that EPA randomly selected from a list of drums previously assayed on LANL HENC #2 that was provided by LANL-CCP. The drums selected were identified as Containers 555700, 52277, and 53991. At EPA's request, site personnel reassayed each of these drums five times for this inspection. Two statistical tests, a χ^2 test and a *t* test, were performed for the replicate analyses on each container. Attachments B.7 through B.12 to this report include analytical data for each assay event and results of the statistical analysis.

The χ^2 test for all measured parameters for all three containers showed that the observed variances in the replicate measurements were less than or equal to the reported uncertainties for all values within the statistical limits of the test.

For Containers 55700 and 52277, the *t* test showed no statistically significant differences between the original measurement assay values and the average of the five replicate measurements for all measured parameters. For Container 53991, the *t* test showed a "highly significant" flag for only ^{242}Pu, indicating that the variances in the replicate measurements for ^{242}Pu were greater than the reported uncertainties for all values relative to the limits of the test. A close examination of the data reveals that the original measurement differs slightly from the mean of the five replicates, although the difference appears small. There are several possible reasons for this—actual changes in the physical configuration of the drums' contents due to movement or settling; fluctuations in the measurement system's background; or actual changes in the measurement system, the very aspect that this test is designed to query. Although the software identified these variances as "highly significant," this does not necessarily indicate a measurement issue that warrants additional attention at this time. EPA may, however, request additional replicate analyses for the LANL HENC #2 at a later date. There is no technical issue at this time relative to the highly significant flags for the ^{242}Pu values on the χ^2 test for the LANL HENC #2 replicates.

As part of the follow-up inspection in March 2007, EPA requested that LANL-CCP reassay two waste drums that EPA randomly selected from a list of drums previously assayed on the LANL HENC #2 that was provided by LANL-CCP. EPA selected Container No. S817309 (S3000

sludge matrix) and Container No. 61209 (S5000 debris matrix). At EPA's request, site personnel reassayed both drums five times for this inspection. The EPA inspection team observed the loading and the initiation of the assay sequence for Container No. S817309. Two statistical tests, a χ^2 test and a *t* test, were performed for the replicate analyses on both containers. Attachments B.19 through B.22 to this report include analytical data for each assay event and results of the statistical analysis. Analysis of the results is presented below.

Container No.61209, showed no statistically differences between the original measurement assay values and the average of the five replicate measurements for all measured parameters using the *t* test and a "highly significant" flag for ^{239}Pu, ^{240}Pu, ^{242}Pu and ^{241}Am using the χ^2 test. Container No. 61209 was a very low signal drum with a total TRU alpha concentration of approximately 230 nCi/g, and the original measurement differs slightly from the mean of the five replicates, although the difference is minimal. There are several possible reasons for this:

- Changes in the physical configuration of a drum's contents due to settling or shifting resulting from drum movement/staging or related waste management activities on site over the time period between the initial and replicate measurements
- Fluctuations in the measurement system's background due to normal fluctuations or placement of higher radionuclide-bearing containers in proximity to the measurement system
- Actual changes in the measurement system, the very aspect that this test is designed to query.

For a low signal drum where the reported values are close to the system's detection limit, small changes in background or the expected variability associated with nuclear transitions can produce effects that appear large using these statistical metrics. Irrespective of the assignment of a "highly significant" flag to these differences, their magnitude is small. Additionally, the container's total TRU alpha activity concentration agreed well between the original measurement and the replicates. Accordingly, there is no technical issue at this time relative to the "highly significant" flags for the ^{239}Pu, ^{240}Pu, ^{242}Pu and ^{241}Am values using the χ^2 test.

Container No. S817309 showed a "highly significant" flag for a single radionuclide, ^{242}Pu, using the *t* test and a "highly significant" flag for ^{238}Pu, ^{240}Pu, ^{242}Pu and ^{241}Am as well as ^{137}Cs and ^{90}Sr using the χ^2 test. The magnitude of the differences for the χ^2 test are small, and the ^{238}Pu values for the original measurement and the mean of the five replicates are virtually identical, i.e., 1.53E-01 and 1.51E-01. With the exception of ^{242}Pu, the differences between the original and mean of the five replicates for the other TRU radionuclides are similarly small and do not represent a technical concern regarding precision of the LANL HENC #2. Regarding the ^{137}Cs and ^{90}Sr results, although the χ^2 test identified these results as "highly significant", this does not necessarily represent a measurement concern for the LANL HENC #2. It is important to note that ^{137}Cs is quantified based on a disproportionate response at the 662 keV line of ^{241}Am relative to that peak's 722 keV line, which is then attributed to ^{137}Cs based on predetermined statistical spectral criteria. This results in a highly variable quantity as a function of the technique used to indirectly determine the quantity of ^{137}Cs independent of the true measurement-related attributes of the photon measurement system, i.e., amplifier gain or detector reliability. Examination of the results reveals that the replicate measurements were all very close

with a small standard deviation. Because the ^{137}Cs value is in turn used to derive the container's ^{90}Sr content by applying a scaling factor, any statistical anomaly for ^{137}Cs will by definition also apply to ^{90}Sr.

There are no technical issues relative to the additional replicate testing for the LANL HENC #2

Technical Evaluation: PTGS

(1) The design and operational history of the PTGS was assessed.

EPA found that the PTGS, which is located in Building B54-438 on Pad G in TA-54, was essentially unchanged since the last EPA evaluation performed in April 2005. The PTGS is an automated NDA system that is designed to quantify the amount of ^{239}Pu in a 55-gallon waste drum and that uses a single HPGe detector to detect gamma rays emitted by ^{239}Pu. A tungsten shield and collimator limit the detector view and provide shielding. In addition to measuring the emission rate of ^{239}Pu, the HPGe detector also measures the attenuation of gamma rays emitted by a ^{75}Se transmission source located on the opposite side of the drum from the detector. Detector signals were processed by an EG&G DSPEC™ signal processor, and the assay was controlled by ANTECH's MasterScan software package. The PTGS used a ^{109}Cd source to correct for the dead time of the system. During the assay, the drum was rotated and translated vertically and horizontally. By viewing the drum from many positions, the operators calculate ^{239}Pu emission and matrix attenuation properties for each volume element (voxel) of the drum. Each voxel was approximately the size of 2 in.^{3} (approximately 5 cm^3). By summing the quantity of ^{239}Pu in each voxel, the total quantity of ^{239}Pu in the drum is calculated. During the inspection it was observed that the PTGS had been assigned standby operational status for reasons not related to performance (i.e., it was idle due to logistical factors or drum availability).

Two separate HPGe detector systems are located in Building B54-439 on Pad G in TA-54, and they are referred to as FRAM 1 and FRAM 3 (currently there is not a FRAM 2). FRAM 1 consists of HPGe Detector No. 137-P407961, Nomad Analyzer SN 95 7378, and Dell Computer No. 1138460. FRAM 2 consists of HPGe Detector No. 40P21213B, Nomad Analyzer SN 917943, and Dell Computer No. 1138459. Each FRAM unit has a corresponding logbook that site personnel use to record pertinent assay-related information and the system's operational status. During the inspection, it was observed that both FRAM systems were on standby for reasons not related to performance (i.e., they were idle due to logistical factors or drum availability). These two systems measure the ratios of gamma-ray emitting radionuclides to ^{239}Pu using the FRAM software. By combining the isotopic data from one of the FRAM systems with the ^{239}Pu data determined by the PTGS, site personnel calculate the total quantity of individual radionuclides along with other derived quantities, such as the total TRU alpha activity, TRU alpha activity concentration, decay heat, and plutonium equivalent curies. EPA found that all aspects of the PTGS and FRAM units were technically adequate and appropriately documented.

The use of a different NDA system not observed during this inspection or physical modifications to the PTGS described above is a T1 change (see Table 1 where this is included as a T1 change).

Changes to the software or operating range(s) of the PTGS, and to the site procedures that govern its use that require CBFO approval are T2 changes (see Table 1 that includes these as T2 changes).

(2) System calibration of the PTGS had been performed as required.

NWIS-TP:05-0141, *Portable TGS Mass Calibration and Calibration Confirmation for Pu-239*, dated August 3, 2005, documents the calibration of record for the PTGS, and lists Joe Wachter as the originator. This was a complete recalibration that was performed in August 2005 in accordance with CCP-TP-123 and NWIS-TP: 2005-0131, *Recalibration and Confirmation Plan—June 2005*. The recalibration was prompted by a low bias in the weekly control check measurements observed beginning on June 6, 2005. The recalibration was performed using PDP-style encapsulated weapons-grade PuO_2 sources with masses of 0 g, 0.6 g, 3 g, 10 g, 100 g, and 189 g in a combustible matrix. This provides an operational range of 0.565 g ^{239}Pu (0.6 g total plutonium) and 176.75 g ^{239}Pu (189 g total plutonium) that LANL-CCP states is identical to the system's calibrated range. The calibration protocol and its execution were technically adequate and appropriately documented. In July 2005, LANL-CCP confirmed the calibration as required by assaying different $^{239}PuO_2$ sources in a series of combinations that resulted in assay totals of 0.9 g, 9 g, and 160 g in the same combustible (non-interfering) matrix. The calibration confirmation passed the WAC-stipulated measurement criteria for precision and accuracy—percent relative standard deviation and relative percent accuracy, respectively—and was technically acceptable in other aspects and adequately documented. LANL-CCP personnel stated that no actual waste drums for WIPP were affected by the PTGS low bias problem in June 2005. The EPA inspection team confirmed this by evaluating the LANL-PTGS 2006 Operational Logbook, Control No. LANL-NDA-PTGS-003, that was located in TA-54-B438, the PTGS trailer.

The FRAM units are not calibrated in the same manner as the PTGS. The FRAM software contains a series of internal performance checks that are executed with each and every assay event. These performance checks take the place of the energy versus channel and peak resolution calibrations (full-width-at-half maximum) that are typical of photon spectrometers. EPA had previously evaluated and approved the LANL FRAM operation on several occasions (see EPA Docket No. A-98-49, II-A4-43).

The extension of or changes to the stated calibration range for the PTGS is a Tier 1 change (see Table 1 where this is included as a T1 change.)

(3) The TMU of the PTGS had been determined and documented.

The determination of the TMU for the PTGS was documented in two places—TWCP-09491, *Method for Computing Total Measurement Uncertainty for the Portable TGS System*, dated August 29, 2002, that lists David Miko as the author (also listed as Document No. P2010-0516) and *Revision to TWCP-23398, Total Measurement Uncertainty for the Portable Tomographic Gamma Scanner (PTGS)*, dated March 30, 2005, which lists Joe Wachter as the author. The TMU determination included contributions from self-shielding (lumps of plutonium), source position/distribution, matrix properties, and system calibration. LANL-CCP personnel referred to these combined components as the system uncertainty. The system uncertainty, estimated to be 11.7%, was combined with uncertainties from counting statistics and the FRAM isotopic

analysis, and was calculated for each individual assay to determine the TMU of the reported values. EPA found that the TMU for the PTGS was technically adequate and appropriately documented.

(4) The LLD, including the MDC of the PTGS, had been determined and documented.

CCP-PO-002, *CCP Transuranic Waste Certification Plan*, Revision 11, defined LLD 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 predominantly a function of both the properties of the waste matrix being assayed and the environmental background. For this reason, the LLD is expected to vary from drum to drum and even between measurements of the same drum. NWIS-TP: 05-0094, *Lower Limit of Detection for LANL Portable Tomographic Gamma Scanner (PTGS)*, dated March 15, 2005, documented the determination of the LLD of the PTGS. Although the LLD was not determined for each assay, the LLD estimated for a typical measurement is approximately 0.28 g ^{239}Pu, which is considerably less than the lower end of the PTGS operating range of 0.565 g ^{239}Pu. EPA found that the LLD for the PTGS was technically adequate and appropriately documented.

(5) EPA coordinated and evaluated replicate testing of the PTGS.

The purpose of the replicate testing during this inspection was to provide EPA with an independent means to verify that the PTGS could provide consistent, reproducible results for the determination of the quantity of 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) and the TRU alpha concentration. This was accomplished by reassaying drums previously characterized on the same system or instrument in order to evaluate its ability to do the following:

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

As part of the inspection to certify the PTGS, EPA requested that LANL reassay a group of waste drums that EPA randomly selected from a list of drums previously assayed on the PTGS that was provided by LANL-CCP. The three were Container Nos. 52338, 53551, and 54857. At EPA's request, LANL-CCP reassayed each of these previously assayed drums five times for this inspection. Two statistical tests, a χ^2 test and *t* test, were performed on the replicate data for each container. Attachments B.13 through B.18 to this report include analytical data for each assay event and results of the statistical analysis.

The *t* test for Container No. 52338 showed no statistically significant differences between the original measurement assay values and the average of the five replicate measurements for all measured parameters. The *t* test for Container Nos. 53551 and 54857 showed "highly significant" flags for ^{238}Pu, ^{239}Pu, ^{242}Pu and ^{241}Am, as well as for TRU alpha activity, indicating statistically significant differences between the original measurement assay values and the average of the five replicate measurements for these radionuclides. The "highly significant" flag for ^{238}Pu, ^{239}Pu, ^{242}Pu and ^{241}Am, as well as for TRU alpha activity, indicates that the variances in the replicate measurements for these items were greater than the reported uncertainties for all values relative to the limits of the test. The TRU alpha activity reflects the contributions of these and other TRU radioisotopes, and since ^{238}Pu and ^{239}Pu are the major contributors to this, this flag is expected for TRU alpha activity. Close examination of the data shows that while the agreement among the replicates is good, the "highly significant" flag does not appear to be an artifact. Specifically, the original measured values for these radionuclides for both drums clearly differ from the mean of the five replicates. There are several possible reasons for this—actual changes in the physical configuration of the drums' contents due to movement or settling, discussed below; fluctuations in the measurement system's background; or, actual changes in the measurement system, the aspect that this test is designed to query. Although the software identified these variances as "highly significant," this does not necessarily indicate a measurement issue that warrants additional attention at this time. It does, however, point out one of the test's limitations particularly for the PTGS which keys all radionuclide values off a single measured radionuclide, ^{239}Pu. The source material (^{239}Pu) within the drum may in fact be quite small in physical size and could have shifted through drum movement. The new configuration of ^{239}Pu within the container may represent an essentially new measurement geometry for the container, in violation of a test assumption that the original and replicate measurements are performed on the same container. Unfortunately, this is difficult to avoid since containers must be moved for purposes of storage, staging and analysis. There is no technical issue at this time relative to these highly significant flags on the χ^2 test for the PTGS.

The χ^2 test for all three containers showed that the observed variances in the replicate measurements are less than or equal to the reported uncertainties for all parameters within the statistical limits of the test.

Summary of NDA Findings and Concerns

The EPA inspection team did not identify any findings or concerns related to the LANL HENC #1, LANL HENC #2 or PTGS NDA systems during 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:

- LANL HENC #1 for passive neutron- and gamma-based quantitative assays and isotopic determinations as described above and detailed in the LANL HENC #1 checklist (Attachment A.2 to this report) over the system's calibrated mass range of LLD to 175 g total plutonium for passive neutron assays and calibrated range for energy and efficiency

of photon emissions from 59 keV to 1,408 keV at sample densities between 0.018 and 1.649 g/cm^3

- LANL HENC #2 for passive neutron- and gamma-based quantitative assays and isotopic determinations as described above and detailed in the LANL HENC #2 checklist (Attachment A.3 to this report) over the system's calibrated mass range of LLD to 16.29 g $^{240}Pu_{Eff}$ for passive neutron assays and calibrated range for energy and efficiency of photon emission from 50 keV to 1,228 keV at sample densities between 0.018 and 1.649 g/cm^3
- PTGS system for gamma-based assays of ^{239}Pu using measured isotopic distributions from the FRAM 1 and/or FRAM 3 gamma systems as described above and detailed in the PTGS checklist (Attachment A.4 to this report) over the system's calibrated/operational range of 0.565 g ^{239}Pu to 176.75 g ^{239}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, A.3, and A.4 to this report). The LANL HENC #1 and LANL HENC #2 systems are currently configured to assay CH retrievably-stored debris (S5000) wastes and heterogeneous solid (S3000) wastes. The PTGS is currently configured to assay CH retrievably-stored debris (S5000) wastes. The use of NDA equipment other than these three systems as 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 proposes assigning the following tiers:

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

- New NDA equipment[8]
- Physical modifications to approved equipment[9]
- 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

[8] 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.

[9] 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.

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

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 measurements from 0 to 200 g of WG Pu or total plutonium typically operate in a smaller range, the system's LLD to 177 g for WIPP. In the case of the LANL PTGS, the calibrated and operational ranges are identical (i.e., 0.56 to 176.79 g ^{239}Pu). 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 1.649 g/cm^3 for the LANL HENC systems 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 range. 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 it beyond 1.649 g/cm^3 for either of the LANL HENC systems 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.

LANL-CCP 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 LANL-CCP and CBFO whether a site inspection is necessary. EPA may request additional information, choose to conduct a desktop review, and/or confer with LANL-CCP NDA personnel. Upon evaluation (with or without site inspection), EPA will issue an approval letter and only upon receiving the EPA approval can LANL-CCP continue to use the equipment affected by the change.

T2 NDA changes do not require prior EPA approval but do require LANL-CCP 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 Canberra NDA 2000)
- 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 (branching ratio) in NDA 2000)
- Introduction of a new version of an existing software package beyond what is in current 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 PTGS 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, if applicable, approved by EPA, according to Table 1. Following EPA approval, LANL-CCP will provide EPA with information concerning T2 changes at the end of each fiscal quarter. EPA will evaluate these changes and communicate with LANL-CCP as to whether the changes raise any concerns and require a LANL-CCP response, or whether LANL-CCP can continue to implement the changes. Consistent with EPA's authority under 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 EPA inspection team focused on overall procedural technical adequacy and implementation, as well as the identification of WMPs and prohibited items, in reviewing the following RTR elements:

- 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 WC:

- Types and amounts of WMPs
- Presence or absence of prohibited items
- Testing for new operators on the RTR system using specifically placed items

Documents, BDRs, and Objective Evidence Reviewed

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

- CCP-TP-053, Revision 4, CCP Standard Real-Time Radiography (RTR) Inspection Procedure, December 22, 2005
- CCP-TP-028, Revision 3, Radiography Test and Training Drum Requirements, January 19, 2006
- CCP-QP-002, Revision 20, Training and Qualification Plan, May 3, 2006
- CCP-TP-001, Revision 11, Project Level Data Validation and Verification, March 23, 2005
- CCP-QP-008, Revision 11, Records Management, August 22, 2005
- CCP-TP-003, Revision 14, Sampling Design and Data Analysis for RCRA Characterization, September 3, 2003
- RTR BDRs LA-RTR2-05-0103, LA-RTR2-05-0111, LA-RTR2-05-0112, LA-RTR2-05-0194, LA-RTR2-04-0007, LA-RTR2-05-0123, LA-RTR2-05-0152, LA-RTR2-05-0175, LA-RTR1-06-0001, LA-RTR1-06-0002, LA-RTR1-06-0003

The following is a complete listing of all objective evidence the EPA team evaluated during the inspection:

- RTR BDRs LA-RTR2-05-0103, LA-RTR2-05-0111, LA-RTR2-05-0112, LA-RTR2-05-0194, LA-RTR2-04-0007, LA-RTR2-05-0123, LA-RTR2-05-0152, LA-RTR2-05-0175, LA-RTR1-06-0001, LA-RTR1-06-0002, LA-RTR1-06-0003
- Audio/visual recording of RTR events for BDRs LA-RTR1-06-0001, LA-RTR1-06-0002, LA-RTR1-06-0003, LA-RTR2-05-0103, LA-RTR2-05-0111, LA-RTR2-05-0112, LA-RTR2-05-0194
- Waste Content Codes, Revision 12
- PowerPoint presentation for operational training for waste stream LA-MHD02.001
- LANL-NDE-TEST-001-CL, Latest capability demonstration drum audio/visual recording for RTR subject matter expert (SME), May 3, 2006
- Latest capability demonstration drum audio/visual recording for RTR operator, July 21, 2005 (no longer qualified)

- List of currently qualified RTR personnel
- CCP-AK-LANL-007

Technical Evaluation

During the inspection, the EPA team investigated the following technical elements of the RTR process (see also Attachment A.5 to this report):

(1) Overall procedural technical adequacy and implementation were considered.

The RTR procedure, documented in CCP-TP-053, Revision 4, *Standard Real-Time Radiography (RTR) Inspection Procedure*, contained specific information on performing non-intrusive radiography, including operational setup and checkout, identification of prohibited items, assignment of WMPs and estimation of weights and volumes, confirmation of WMCs, input of data, issuance of NCRs, and technical review of radiography results.

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

Procedure CCP-TP-053, Revision 4, required that radiography audio/visual recording equipment verification be conducted at the beginning of every shift in which drums are subject to examination. EPA inspectors confirmed adherence to verification requirements through interviews with RTR operators, observation of the RTR events for containers S852566 (RTR Unit 1, S5000) and 58959 (RTR Unit 2, S5000), and review of audio/video tapes for Batches LA-RTR1-06-0001, LA-RTR1-06-0002, LA-RTR1-06-0003, LA-RTR2-05-0103, LA-RTR2-05-0111, LA-RTR2-05-0112, and LA-RTR2-05-0194.

At the beginning of a shift and before examining any waste containers, the operator runs a scan on the lines-pair resolution test gauge to determine that images are clearly visible. On the day of the inspection, the operator had performed this check before EPA arrived at the facility, but the inspectors reviewed the image quality checks for Batches LA-RTR2-05-0103 and LA-RTR1-06-0003. Operators for both RTR units did not have a copy of the waste stream description available for review and could not explain how they answered questions on the RTR data sheet with regard to waste stream description. EPA generated Concern LANL-CCP-VE-06-005CR to address this issue (see Attachment C.5 to this report for a copy of this form) that is discussed in Section 8.4.

For each container undergoing examination, the operator makes an audio/video recording of the RTR event. The first notations that the operator makes on the audio/video recording are the drum number and the date and time on the audio/video recording before beginning the radiography process. The examination of the drum begins at the top drum lid, where the operator identifies the seal and vent. The drum rotates through at least 360 degrees, so that objects are visible from all sides. The operator can zoom both in and out and increase or decrease the scan energy in order to compensate for varying densities in the material being examined. During examination, the operator also "rocks" the drum to determine the presence of free liquids.

The RTR operator identifies WMPs, and a second staff member enters the data electronically into the RTR Data Sheet. This second person is not a qualified RTR operator and performs only

data entry. There is a standardized weight table (Table 3) in the procedure that provides weights for commonly encountered waste items. RTR personnel record the weight of leaded rubber gloves as rubber only. However, VE personnel record the weights of leaded rubber gloves as 60% rubber and 40% other metals. EPA generated concern LANL-CCP-VE-06-006CR to address this discrepancy in WMP weight assignment (see Attachment C.6 to this report for a copy of this form) that is discussed in Section 8.3.

As part of the inspection, the EPA team observed the examination of two waste containers—Container S852566 on RTR Unit 1 and Container 58959 on RTR Unit 2. Both of these drums contained S5000 waste. The EPA inspectors also reviewed the audio/visual recordings of Containers S834121 and S831784 (LA-RTR2-05-0103), S834131 and S831722 (LA-RTR2-05-0111), S834116 (LA-RTR2-05-0112), S845058 (LA-RTR2-05-0194), S851999 (LA-RTR1-06-0003), 52473 (LA-RTR1-06-0001), and S846186 (LA-RTR1-06-0002), and their associated data forms. In all cases the information on the audio/visual recording matched the written RTR record (BDR).

(3) Documentation of radiography activities was examined.

Simultaneous audio and video recordings are made as the waste is examined. The EPA inspectors observed this during the examination of two waste containers and further verified it by review of RTR audio/visual recordings for the above-referenced waste containers. Site personnel enter the data into an electronic radiography data sheet during the RTR event.

(4) EPA ascertained that documentation of radiography procedures was adequate.

Radiography procedures are well defined and the documents are controlled. During the inspection, the EPA team reviewed the adequacy and implementation of all radiography-related procedures. QC examinations were performed as required by the procedure. In Batch LA-RTR1-06-0002, an independent observation was performed on Container 54374 and a replicate scan was performed on Container 55434. In Batch LANL-RTR2-05-0123, an independent observation was performed on Container 59316 and a replicate scan was performed on Container 57776. For the QC replicate, different operators performed the original and the replicate scan.

Site personnel generate NCRs as needed. For example, NCR-LANL-0786-06 was initiated for Drum S833213 because of a sealed container greater than 4 liters, and NCR-LANL-0727-06 was initiated because of the presence of polychlorinated biphenyls. NCR-LANL-0125-05 was initiated for Drum S834116 because it contained greater than 1 inch of liquid at the 30-inch mark and a liquid volume that exceeded 1-percent of the drum's volume.

The BDRs the EPA examined had been reviewed at the data generation level (ITR, TS, FQAO) and project level (SPM and SPQAO) as required.

(5) Training of radiography personnel was adequate.

During the inspection, the EPA team reviewed documentation of the capability demonstration for selected radiography personnel. The inspectors viewed the audio/visual recording for the latest capability demonstration drum for an RTR SME and RTR operator during the inspection.

Training records reviewed indicate that only trained personnel were operating the RTR equipment and that the technical supervisor is responsible for the verification of qualification for RTR operators. RTR operators must review the results of the RTR/VE comparison examinations, but they had not received "lessons learned" training for the last two annual VE/RTR comparison reports. EPA presented this on an EPA Inspection Issue Tracking Form (see Attachments C.8 of this report for a copy of this form) and it is discussed below.

EPA Inspection Issue Tracking Form, Issue No. LANL-CCP-RTR-06-008C. LANL-CCP has generated two annual VE/RTR comparison reports, but at the time of this inspection, RTR operators had not received any "lessons learned" training on the discrepancies between the RTR and VE results.

Resolution: This concern did not require a response.

Status of Concern: This concern is closed.

Training documentation was complete and was filed correctly for purposes of viewing and reference. The documents reviewed include the following:

- List of currently qualified RTR personnel
- PowerPoint presentation for operational training for Waste Stream LA0MHD02.001

EPA inspectors also viewed the following RTR test drum audio/visual recording and verified that the operator identified all prohibited items:

- Requalification checklist and audio/visual recording for RTR SME and RTR operator

Summary of RTR Findings and Concerns

The EPA inspection team did not identify any findings related to RTR and identified the one concern that is discussed above. A copy of the EPA Inspection Issue Tracking Form on which this concern is documented is provided in Attachment C.8 of this report. EPA considers this concern 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 inspection consisted of the following:

- Trained personnel—operator/ITR/TS/FQAO and SME
- Approved and controlled operating procedures—CCP-TP-053, Revision 4; CCP-TP-028, Revision 3; CCP-TP-003, Revision 14; CCP-TP-001, Revision 11; CCP-QP-002, Revision 20

- RTR Units 1 and 2
- RTR records and supporting data—RTR electronic data recording forms, CCP-TP-053 review checklists, CCP-TP-001 review checklists, and RTR BDRs

This system is suitable for RTR of S5000 (debris) and S3000 (solid) wastes.

Proposed RTR Tiers

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

T1 RTR changes: None.

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

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

Any changes to the WC activities from the date of the baseline inspection must be reported to and, if applicable, approved by EPA, according to Table 1. Following EPA approval, LANL-CCP will provide EPA with information concerning T2 changes at the end of each fiscal quarter. EPA will evaluate these changes and communicate with LANL-CCP as to whether the changes raise any concerns and require a LANL-CCP response, or whether LANL-CCP can continue to implement the changes. Consistent with EPA's authority under 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.

8.4 Visual Examination

WC Element Description

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

- Confirmation of WMP and WMC
- Confirmation of presence or absence of prohibited items
- Confirmation of RTR analysis
- Generation of data for calculation of miscertification rates

Procedure CCP-TP-113 is used to perform VE as a QC check of RTR and VE in lieu of RTR.

Documents, BDRs, and Objective Evidence Reviewed

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

- CCP-TP-113, Revision 4, CCP Standard Waste Visual Examination, December 22, 2005
- CCP-QP-002, Revision 20, Training and Qualification Plan, May 3, 2006
- CCP-TP-001, Revision 11, Project Level Data Validation and Verification, March 23, 2005
- CCP-QP-008, Revision 11, Records Management, August 22, 2005
- CCP-TP-003, Revision 14, Sampling Design and Data Analysis for RCRA Characterization, September 3, 2003
- VE in lieu of RTR BDRs LAVE540025, LAVE500081 (unvalidated BDR for demonstration drum)
- VE as a QC check of RTR BDRs LAVE540027, LAVE500060, LAVE500061

Following is a complete list of all objective evidence that the EPA inspection team evaluated during the inspection:

- VE BDRs LAVE540025, LAVE500081, LAVE540027, LAVE500060, LAVE500061
- Audio/visual recording for BDRs LAVE540025, LAVE540027, LAVE500060, LAVE500061
- List of currently qualified VE personnel
- Qualification cards for two VEEs
- List of rejected containers for VE as a QC check of RTR
- Letter, 2006 Selection of Visual Examination Drums from S3000 and S5000 Category Groups, March 23, 2006
- Memorandum, Initial Summary Category Group-Specific S3120 Miscertification Rate, April 26, 2005
- Memorandum, Los Alamos National Laboratory Annual Assessment of the Site Specific Annual Miscertification Rate (S3000 and S5000), February 10, 2006
- Memorandum, 2005 Selection of Visual Examination Drums from S3000 Summary Category Group, March 30, 2005
- Memorandum, 2005 Selection of Visual Examination Drums from S3000 Summary Category Group, June 27, 2005
- Memorandum, Initial Summary Category Group-Specific S5000 Miscertification Rate, March 29, 2005

- Memorandum, Waste Material Parameter Weight Comparison Report for Los Alamos National Laboratory April 2004 Through March 2005 (Relative Percent Difference Comparison Report for Radiography and Visual Examination), April 12, 2005
- Memorandum, Waste Material Parameter Weight Comparison Report for Los Alamos National Laboratory June 2004 Through April 2005 (Relative Percent Difference Comparison Report for Radiography and Visual Examination): Waste Stream LA-MIN03-NC.001, May 26, 2005
- Memorandum, Waste Material Parameter Weight Comparison Report for Los Alamos National Laboratory April 2005 Through December 2005 (Relative Percent Difference Comparison Report for Radiography and Visual Examination), February 7, 2006

Technical Evaluation

During the inspection, the EPA team evaluated the technical elements of the VE process using the checklist included as Attachment A.6 to this report. These areas are summarized as follows:

(1) Overall procedural technical adequacy and implementation were assessed.

The VE procedure, documented in CCP-TP-113, Revision 4, contained specific information on performing VE, including operational setup and checkout, identification of prohibited items, assignment of WMPs and estimation of weights and volumes, confirmation of WMCs, input of data, issuance of NCRs, and technical review of VE results.

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

During the inspection, EPA observed VE in lieu of RTR for a debris (S5000) drum (Drum 601142), and the VE event took place in a glove box in Room 102 of Building 69 at TA-50. The operators had already successfully performed the audio/visual check for the day of the demonstration before the EPA inspection team arrived. The EPA inspectors did, however, verify that audio/visual checks were successfully completed by reviewing tapes for BDR Nos. LAVE540025, LAVE540027, LAVE500060, LAVE500061, as well as the unvalidated batch from the demonstration for LAVE500081. The inspectors reviewed audio/visual tapes in conjunction with the written record (BDR) to ensure consistency of the visual and written records. The EPA inspection team did not identify any discrepancies for the BDRs reviewed.

For the demonstration, the drum contents were emptied, sorted by WMP, and weighed. The EPA inspectors observed the scale calibration performed for this batch. These personnel record the weights for leaded rubber gloves as 60% rubber and 40% other metals. However, the RTR process assigns the entire weight of the leaded rubber glove weights to rubber. In order to address the discrepancy between RTR and VE data recording, the EPA inspectors initiated an EPA Inspection Issue Tracking Form (see Attachment C.6 to this report for a copy of this form), and it is discussed in Section 8.3 and below.

EPA Inspection Issue Tracking Form, Issue No. LANL-CCP-VE-06-006CR. Site personnel inconsistently recorded WMP weights for leaded rubber gloves. RTR personnel record leaded gloves only under the rubber WMP, but VE personnel assign 60% of the weight of the gloves to

rubber and 40% to other metals. VE personnel were unable to provide the rationale for assigning the material weights in this manner. This concern required a response.

Resolution: The LANL-CCP VPM and SPM gave verbal directions to stop this practice and provided training on June 22, 2006. CCP will assign the weight of leaded rubber gloves as 100% rubber.

Status of Concern: This concern is closed.

When reviewing the BDRs for four data packages, EPA reviewed the audio/visual recording concurrently with the BDR to ensure that the data contained in both were the same. By review of the audio/visual recordings, EPA also verified that image quality checks were performed as required. The EPA inspectors reviewed the BDRs listed below:

- BDR LAVE540025 (VE in lieu of RTR, S3000)
- Audio/visual recording for BDRs LAVE540025
- BDR LAVE500081 (unvalidated BDR for demonstration drum, VE in lieu of RTR, S5000)
- BDR LAVE540027 (VE as a QC check of RTR, S3000)
- Audio/visual recording for BDRs LAVE540027
- BDR LAVE500060 (VE as a QC check of RTR, S5000)
- Audio/visual recording for BDRs LAVE500060
- BDR LAVE500061 (VE as a QC check of RTR, S5000)
- Audio/visual recording for BDRs LAVE500061

The EPA inspectors found that all data packages reviewed were correctly completed and had been reviewed at both the data generation and project level.

It is the policy of LANL-CCP to open all bags during VE, although the VEE is permitted to document decisions with regard to opening bags in the BDR. The drums from BDR LAVE500061, reviewed by the EPA inspectors, contained numerous small cans. The VE operators did not completely empty the cans before weighing, and it was unclear how the operators provided a complete inventory of the items inside the cans and how they were able to verify the absence of prohibited items. The VE data forms did not include any justification for not emptying the cans. EPA presented this as a Finding on an EPA Inspection Issue Tracking Form (see Attachment C.4 to this report for a copy of this form) and it is discussed below.

EPA Inspection Issue Tracking Form, Issue No. LANL-CCP-VE-004F: AK Summary CCP-AK-LANL-004 did not predict the quantity and location of prohibited liquid encountered in the RTR examinations of containers performed prior to May 2005 from waste stream LA-MIN03-NC.001. Although characterization personnel initiated NCRs to address the presence of prohibited liquids, this information was not communicated to AK personnel to enable updating of the AK record. CCP personnel used VE in lieu of RTR to characterize wastes from this same waste stream from May 4, 2005, through June 23, 2005. However, the presence of liquids made the use of this technique unsuitable for containers of solid (S3000) wastes. Until

corrective action is taken, the use of this technique to characterize WIPP wastes, in particular dewatered sludge, at CCP sites is unacceptable.

Resolution: CBFO Interpreted this finding as a prohibition of the use of VE for all solid (S3000) waste streams throughout the DOE complex. This was not EPA's intention and EPA provided verbal clarification to CBFO regarding this on multiple occasions. EPA did intend this finding to prohibit the use VE for de-watered sludge containers at LANL-CCP and to prompt CBFO to reexamine the use of VE for similar wastes throughout the complex. During the follow-up March 6, 2007 inspection LANL-CCP has committed to conducting additional training for the SPMs and AKEs to develop and issue, as necessary, a memorandum that will be included in the AK record to document special characterization requirements for S3000/S4000 summary category group wastes. The purpose of this memorandum is primarily to document the technical basis for the decision to use VE in lieu of RTR.

Status of Concern: This concern is closed.

There was another concern identified relative to the documentation of WMPs during the inspection. EPA presented this as a Concern 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. LANL-CCP-VE-06-007CR: The containers examined by VE in BDR LAVE500061 (VE as a QC check of RTR) contained numerous small cans that were opened but not emptied during the VE event. LANL-CCP personnel were unable to demonstrate that all of the WMPs contained in the cans were inventoried, and the VE procedure does not address this circumstance.

Resolution: During the follow-up March 6, 2007 inspection LANL-CCP committed to conducting additional training for the VE operators and VE experts to emphasize the importance of including a greater amount of audible content (verbal) on the recordings made during the VE events to allow an independent person to reach the same conclusion as the VE operator or VE expert.

Status of Concern: EPA expects to receive objective evidence during the public comment period documenting the completion of the VE training performed in response to this concern. This concern is closed.

(3) Documentation of VE activities was examined.

EPA inspectors reviewed data packages listed in paragraph (2) above to verify that the VE data were documented correctly and completely. Site personnel use a VE data form for data entry (CCP-TP-113, Attachment 1). Except for LAVE500081, all the data packages reviewed included completed data generation and project-level review checklists. Site personnel make audio/visual recordings of the VE events, and the EPA inspection team viewed the recordings for the BDRs listed above to ensure consistency of the recorded data. Site personnel entered the data that were generated during the VE event observed by the EPA inspectors into electronic data forms. Table 4 in the procedure, "Waste Item Weights and Weighing Codes," contains standardized weights for items commonly found in the waste streams examined.

EPA identified an issue with the documentation of VE activities during this inspection. This was presented as a Concern on an EPA Inspection Issue Tracking Form (see Attachment C.5 to this report for a copy of this form) and it is discussed in Section 8.3 and below.

EPA Inspection Issue Tracking Form, Issue No. LANL-CCP-VE-06-005CR. Attachments used for data entry for both RTR and VE include a line item that requires operators to verify that the waste examined matches the waste stream's description. The VEE for the VE demonstration and the operators of RTR units 1 and 2 who were observed by the EPA inspectors on May 24, 2006, could not explain how to complete this line item. These personnel did not have a copy of the waste stream descriptions (e.g., CCP-LANL-AK-9) in their respective work areas, nor were they able to describe the items included in the waste stream descriptions provided in the AK summary report for the waste stream they were currently examining.

Resolution: Prior to the March 6, 2007, follow-up inspection, EPA reviewed a copy of the LANL-CCP RTR and VE Training Module (PowerPoint presentation) and the Non Destructive Examination (NDE) RTR Comprehensive Examination. During the March 2007 follow-up inspection, EPA interviewed RTR operators who were able to correctly answer questions with the regard to the items on the data form that are detailed above. The operators also demonstrated to EPA that they had access to both paper and electronic copies of the applicable AK waste stream descriptions.

Status of Concern: This concern is closed.

(4) Calculation of miscertification rates was examined.

At the time of the inspection, LANL-CCP had calculated a miscertification rate for summary category group (SCG) S5000 (debris) and S3000 (solids). Various interoffice memoranda establish the miscertification rate for S5000 and S3000 waste. LANL-CCP correctly established the number of containers to be examined by VE, and container numbers were randomly selected. LANL-CCP selected extra containers to ensure that replacement containers were identified if they were required. Site personnel documented the reason for rejecting any container. The algorithm used for the calculation was appropriate.

EPA examined the following miscertification rate objective evidence:

- Memorandum, Los Alamos National Laboratory Annual Assessment of the Site Specific Annual Miscertification Rate (S3000 and S5000), February 10, 2006
- Memorandum, 2005 Selection of Visual Examination Drums from S3000 Summary Category Group, March 30, 2005
- Memorandum, 2005 Selection of Visual Examination Drums from S3000 Summary Category Group, June 27, 2005
- Memorandum, Initial Summary Category Group-Specific S5000 Miscertification Rate, March 29, 2005

- Memorandum, Waste Material Parameter Weight Comparison Report for Los Alamos National Laboratory April 2004 Through March 2005 (Relative Percent Difference Comparison Report for Radiography and Visual Examination), April 12, 2005
- Memorandum, Waste Material Parameter Weight Comparison Report for Los Alamos National Laboratory June 2004 Through April 2005 (Relative Percent Difference Comparison Report for Radiography and Visual Examination): Waste Stream LA-MIN03-NC.001, May 26, 2005
- Memorandum, Waste Material Parameter Weight Comparison Report for Los Alamos National Laboratory April 2005 Through December 2005 (Relative Percent Difference Comparison Report for Radiography and Visual Examination), February 7, 2006
- List of rejected containers for VE as a QC check of RTR

(5) Training for VE personnel was examined.

The site maintains a list of qualified individuals, which it uses to ensure that all training is current. The site documents the personnel who are trained for VE, which includes VET because both VE and VET are performed by personnel from the same pool of qualified individuals. During the inspection, the EPA team reviewed the qualification packages for both characterization and facility VE personnel and found that they require comprehensive and adequate training for VE personnel.

The EPA inspectors reviewed the following records:

- VE operator/ITR/TS/FQAO qualification card for two VEEs
- List of qualified VE personnel

Summary of VE Findings and Concerns

The EPA inspection team identified the one finding and three concerns related to VE that are discussed above. Copies of the EPA Inspection Issue Tracking Forms are provided in Attachments C.4 through C.7 of this report. EPA considers all findings and concerns to have been adequately addressed and there are no open findings or concerns related to VE resulting from this inspection.

Proposed Baseline Approval

The VE system for retrievably-stored waste that the EPA inspection team evaluated during this baseline inspection consisted of the following elements:

- Trained personnel—VE operators, VEEs, SPM, and SPQAO
- Approved and controlled operating procedures—CCP-TP-113, Revision 4; CCP-TP-028, Revision 3; CCP-TP-003, Revision 14; CCP-TP-001, Revision 11; CCP-QP-002, Revision 20

- VE records and supporting data—electronic VE data form, CCP-TP-053 review checklists, CCP-TP-001 review checklists, and VE BDRs

VE as a QC check of RTR and VE in lieu of RTR are suitable for S5000 debris and S3000 solid waste.

Proposed VE Tiers

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

T1 VE changes: None.

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

- Changes made to site VE procedure(s) that require CBFO approval

Any changes to the WC activities from the date of the baseline inspection must be reported to and, if applicable, approved by EPA, according to Table 1. Following EPA approval, LANL-CCP will provide EPA with information concerning T2 changes at the end of each fiscal quarter. EPA will evaluate these changes and communicate with LANL-CCP as to whether the changes raise any concerns and require a LANL-CCP response, or whether LANL-CCP can continue to implement the changes. Consistent with EPA's authority under 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.

8.5 Sealed-Source Visual Examination Technique

WC Element Description

The VET process for sealed sources uses manual examination to determine the following aspects of TRU WC:

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

Procedure CCP-TP-069, *CCP Sealed Source Visual Examination and Packaging*, Revision 3, dated December 7, 2005, is used for VET of sealed sources.

Documents, BDRs, and Objective Evidence Reviewed

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

- CCP-TP-069, Revision 3, CCP Sealed Source Visual Examination and Packaging, December 7, 2005
- OSR-OP-180, Revision 0, Assembly Procedure for LANL Special Form Capsule, Model II, May 10, 2005
- CCP-QP-002, Revision 21, Training and Qualification Plan, June 13, 2006

The following is a complete listing of all objective evidence that was evaluated during the inspection:

- BDR LA06-OSR-VE-002
- Attachment 4 from CCP-TP-069 for sources processed during EPA's observation of a VET event, performed at an offsite location
- Qualification cards for VET operator/ITR/TS/FQAO and VE SME

Technical Evaluation

During the inspection, the technical elements of the sealed source VET process were evaluated using the checklist contained in Attachment A.7 and are summarized below.

(1) Overall procedural technical adequacy and implementation was evaluated.

The VET procedure, documented in CCP-TP-069, Revision 3, contains specific information on performing VET of sealed sources, including the identification of prohibited items, assignment of WMPs, and estimation of weights. The procedure also contains instructions for closing of POC, if used, and drum. The special form capsule, used to receive sources and, when closed, to form the sealed source, is tested before use in accordance with LANL Procedure OSR-OP-180, *Assembly Procedure for LANL Special Form Capsule, Model II*, Revision 0, dated May 10, 2005. Attachment 4 of procedure CCP-TP-069 is used to record all the VE data generated.

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

EPA observed the packaging of four ^{241}Am (80 mCi each) sources at Radiation Technology, Inc., located at 8407 Skyline Avenue, Odessa, Texas. The LANL personnel who performed this VET event were a VET operator, a VET packager, and a Radiological Control Technician (RCT).

Prior to arriving at the site, the LANL personnel compiled a work plan that included information on the source's radionuclides, expected activity, AK Summary, and waste stream description, as available. The special form capsule was inspected for usability at the start of the process in accordance with LANL procedures. The VET operator inspected the sources to locate any identification or other markings but found none on the sources to be packaged. Prior to loading, the special form capsule is etched with information about the sealed sources to be placed in it, a step that is not required by CCP-TP-069 but is required in Section 7.3c of OSR-OP-170. As part of the VET event, the operators verify that no prohibited items are present and that the WMC is correct. These data are entered into Attachment 4, *Container Packaging and VE Data Record*, to Procedure CCP-TP-069. These sealed sources are designated as WMC S5100 (debris).

(3) Documentation of VET activities was examined.

The VET operator completed Attachment 4 to Procedure CCP-TP-069 electronically as information became available. The data recorded included the presence/absence of prohibited items, WMC, POC, and drum closure. Other information included the following:

- Drum LA00000062745
- Filter NucFil-013, Serial No. LC-734, December 2002
- POC Filter UT9400, Serial No. 025194, January 2003, S100 (6-inch pipe component)
- Capsule Model II-1-0268
- Outside TID No. LANL 001416

EPA reviewed BDR LA06-OSR-VE-002 to verify that the data sheets were complete. Both data-generation level and project-level review checklists were completed and attached to the BDR.

(4) Training for VET personnel was examined.

The site maintains a list of qualified individuals, which is used to ensure that only qualified individuals conduct operations. Personnel who perform sealed source VET are listed under the "Off-site Source Recovery Project, Visual Examination" section of the list of qualified individuals. This list included the two VET operators who performed the offsite VET event observed by EPA. As part of the inspection, the EPA team reviewed the qualification cards for two VET operators, one of whom was a designated SME. The qualification cards demonstrated that training for these personnel was current and complete for VET of sealed sources.

The inspectors reviewed the following records:

- VET operator/ITR/TS/FQAO qualification card
- VETSME qualification card
- List of qualified VET personnel

Summary of Sealed Source VE Findings and Concerns

There were no findings or concerns related to VET and packaging of sealed sources identified during this inspection.

Proposed Baseline Approval

The VE system for sealed source examination and packaging that the EPA inspection team evaluated during this baseline inspection consisted of the following:

- Trained personnel—operator/ITR/TS/FQAO and SME
- Approved and controlled operating procedures—CCP-TP-069, Revision 3; CCP-QP-002, Revision 21
- OSRP records and supporting data—VET electronic data recording forms, CCP-TP-069 review checklists, CCP-TP-001 review checklists, and OSRP VE BDRs

This system is suitable for VET of S5000 (debris) waste from the LANL OSRP.

Proposed Sealed Source VET Tiers

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

T1 VET changes: None.

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

- Changes made to the VET procedure for OSRP wastes that require CBFO approval

Any changes to the WC activities from the date of the baseline inspection must be reported to and, if applicable, approved by EPA, according to Table 1. Following EPA approval, LANL-CCP will provide EPA with information concerning T2 changes at the end of each fiscal quarter. EPA will evaluate these changes and communicate with LANL-CCP as to whether the changes raise any concerns and require a LANL-CCP response, or whether LANL-CCP can continue to implement the changes. Consistent with EPA's authority under 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.

8.6 WIPP Waste Information System

WC Element Description

LANL-CCP has successfully submitted WC data for TRU waste containers to the WWIS in the past (see EPA Inspection No. LANL-CCP-04.05-8, conducted in April 2005 and reported in EPA Docket No. A-98-49, II-A4-57). The CCP procedures, practices, and personnel who process container data that the EPA inspectors observed at LANL-CCP are the same as those used at other TRU generator sites currently approved for CH WC by EPA. Procedure CCP-TP-030 is used for submittal of both characterization and certification data to the WWIS.

Documents, BDRs, and Objective Evidence Reviewed

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

- CCP-TP-030, Revision 8, TRU Waste Certification and WWIS Data Entry, May 1, 2006
- CCP-QP-002, Revision 20, Training and Qualification Plan, May 3, 2006

The EPA inspectors evaluated the following objective evidence during the inspection:

- Waste Container Data Report for Containers LA00000052034 and LA00000061956
- WWIS data entry summary—characterization and certification for Containers S811270 and LA00000059179
- Correlation of container identification, May 4, 2006
- WWIS data entry personnel qualification card
- WWIS shipment summary report
- List of NCR/corrective action report (CAR) status for selected containers
- CCP-WCO data entry activities, data checklist for containers to be shipped, Container S811270
- E-mail, Transmitting NCR/CAR Dispositions for Lot LANL 701, May 11, 2006
- LA-MHD02.001, CCP WSPF

Technical Evaluation

(1) Overall procedural technical adequacy was evaluated.

The WWIS procedure, documented in CCP-TP-030, *TRU Waste Certification and WWIS Data Entry*, Revision 8, dated May 1, 2006, is well defined and controlled and contains complete instructions for entering, reviewing, and transmitting data. The WWIS data entry procedure incorporates adequate reviews to minimize the transmittal of noncompliant or incorrect data. The Microsoft Excel spreadsheet, used for data entry, was also adequate and controlled. The EPA inspectors identified no adequacy issues for the procedure or spreadsheet. Changes made to the WWIS procedure(s) that require CBFO approval is a T2 change. (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. After the data have been through every level of review and approval, they are compiled into a drum file and entered into a controlled Excel spreadsheet by the waste certification assistant (WCA). The waste certification official (WCO) reviews the data to ensure that they are WIPP-compliant and signs the spreadsheet to accept the data. At this point, site personnel convert the data into ASCII format files and transmit them to the WWIS. The information contained in the drum file is subsequently used for transportation activities. The EPA inspectors viewed demonstrations of data storage and retrieval. LANL-CCP personnel were able to retrieve and print requested records, including WWIS access requests and waste container data reports for Containers LA00000059179 and S811270. Changes made to the

WWIS data entry summary (e.g., Excel characterization and certification spreadsheets) that require CBFO approval is a T2 change. (See Table 1, where this is included as a T2 change).

(3) Training of WWIS personnel was reviewed.

The EPA inspectors observed the actual job performance of a WCO to verify training and qualification. Inspectors also reviewed the training and qualification package for a WCA (data entry personnel). Required training included use of the WWIS user's manual, and the required reading list included the WIPP WAP and DOE/CBFO quality assurance program document (DOE/CBFO-94-1012, *Quality Assurance Program Description (QAPD)*, Revision 7, dated July 2005). Training documentation was complete and filed correctly for viewing and reference.

Summary of WWIS Findings and Concerns

There were no findings or concerns related to WWIS identified during this inspection.

Proposed Baseline Approval

The container certification system that the EPA evaluated during this baseline inspection consisted of the following:

- Trained WWIS WCA (formerly, data entry personnel) and WCO
- Approved and controlled operating procedures—CCP-TP-030, Revision 18; and CCP-QP-002, Revision 20
- Approved and controlled Excel spreadsheet, WWIS data entry summary—characterization and certification

Proposed WWIS Tiers

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

T1 WWIS changes: None.

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

- Changes to WWIS procedure(s) that require CBFO approval
- Changes to the Excel spreadsheet, WWIS data entry summary—characterization and certification

Any changes to the WC activities from the date of the baseline inspection must be reported to and, if applicable, approved by EPA, according to Table 1. Following EPA approval, LANL-CCP will provide EPA with information concerning T2 changes at the end of each fiscal quarter. EPA will evaluate these changes and communicate with LANL-CCP as to whether the changes

raise any concerns and require a LANL-CCP response, or whether LANL-CCP can continue to implement the changes. Consistent with EPA's authority under 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.

9.0 RESPONSE TO COMMENTS

This section is reserved for public comments in response to the EPA's proposed approval decision.

10.0 SUMMARY OF RESULTS

10.1 Findings and Concerns

The findings and concerns issues identified during the inspection as well as LANL-CCP'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.

LANL-CCP 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 LANL-CCP WC program activities were technically adequate. EPA is proposing to approve the LANL-CCP WC program in the configuration observed during this inspection and described in this report and the attached checklists (Attachments A.1 through A.8). This proposed approval includes the following:

(1) The AK and load management process for CH retrievably-stored TRU debris and solid wastes and for newly-generated debris wastes from the OSRP

(2) The LANL HENC #1 and LANL HENC #2 NDA systems for assaying solid and debris wastes

(3) The PTGS NDA system for assaying debris waste

(4) VE as a QC check of the RTR process and in lieu of the RTR process for retrievably-stored solid and debris wastes and VET of newly-generated debris wastes from the OSRP

(5) The nondestructive examination process of RTR for retrievably-stored solid and debris wastes

(6) The WWIS process for tracking of waste contents of solid and debris wastes, including debris from the OSRP

LANL-CCP must report and, if applicable, receive EPA approval of any changes to the WC activities from the date of the baseline inspection, according to Table 5, below. Table 1 in this

report is not identical to those included in previous baseline inspection reports and EPA site approval letters in several ways. The most important of these involve presentation of the Tier 2 (T2) elements. In previous reports there were two Tier 2 (T2) columns that have been merged into a single T2 column for LANL-CCP. 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 inspection reports for sites characterizing remote handled TRU waste. Additionally, there are other minor word changes to the table for the sake of legibility.

There are changes to specific WC areas as well. For AK, the AK Reassessment Memoranda (reflecting resolution to concern LANL-CCP-AK-06-001CR) and the AK-VE Memoranda related to VE cited under T2 changes (reflecting resolution to finding LANL-CCP-VE-06-004F) and do not appear in the tiering tables in previous baseline inspection reports. Similarly, requesting revisions to CCP-AK-008 or notification regarding the combination of waste streams that were distinct at the time of inspection are specific to the LANL OSRP or the result of information identified during this inspection. Accordingly, these are absent from the tiering tables in previous baseline inspection reports. For WWIS, changes to specific process elements (e.g., spreadsheets and data fields) are cited as T2 changes and these did not appear in previous tiering tables. These were added to provide a greater degree of specificity in an attempt to identify and focus on the key elements relevant to waste isolation.

The scope of the site baseline compliance decision is based on EPA's inspections completed on May 25, 2006, and August 22, 2006, and the follow-up evaluation conducted on March 6, 2007

Table 5. Tiering of TRU WC Processes Implemented by LANL-CCP
Based on May 23–25, 2006 On Site Baseline Inspection, August 22, 2006 OSRP Inspection and March 6, 2007 Evaluation

WC Process Elements	LANL-CCP WC T1 Changes	LANL-CCP WC T2 Changes*
Acceptable Knowledge (AK) and Load Management	Any new waste category, or new OSRP wastes addressed in AK Summaries separate from CCP-AK-008; AK (3), AK (6), AK (16) and (AK) 17 Implementation of Load Management for waste streams other than AK-009; AK (5)	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 Reassessment Memoranda; AK (1) and AK (6) - AK-VE Memoranda related to VE and/or RTR techniques; AK (2) - AK-NDA Memoranda; AK (3) - Site procedures requiring CBFO approval; AK (4) - AK Summary CCP-AK-008, if changed to include newly approved ^{239}Pu and ^{241}Am sealed sources and/or irradiated sources; AK (6) - Combination of waste streams that were distinct at the time of this inspection; AK (6) - Change Notices used to modify and update WSPFs, including additions to waste stream(s) within an approved waste category; AK (9)
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 approvals; RTR (2)
Visual Examination (VE) and Visual Examination Technique (VET), including OSRP Wastes (Sealed Source VET or SSVET)	N/A	Notification to EPA upon the following: - Completion of changes to site VE and VET procedures requiring CBFO approvals, including OSRP VET procedure; VE (1) and SSVET (1)
WIPP Waste Information System (WWIS)	N/A	Notification to EPA upon the following: - Completion of changes to WWIS procedure(s) requiring CBFO approvals; WWIS (1) and WWIS (2) - Changes to the Excel spreadsheet, WWIS data entry summary, characterization and certification; WWIS (1) and WWIS (2)

* Upon receiving EPA approval, LANL-CCP 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.

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, 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.8

ATTACHMENT A.1: ACCEPTABLE KNOWLEDGE (AK) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8 **Inspection Dates: May 23-25, 2006**

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)	CCP-TP-005, Revision 16; CH-WAC Rev. 3; P.L. 102-579	Yes	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006). Load management to be performed for LANL-009 only.
AK-2: Do the presented volumes comport with LWA capacity restrictions? (P.L.102-579)	CCP-TP-005, Revision 16; CH-WAC Rev. 3; P.L. 102-579	Yes	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009, (March 9, 2006). Data examined identified no issues with respect to waste volume.
AK-3: Are any wastes considered (or previously considered HLW? HLW are prohibited. (P.L.102-579)	CCP-TP-005, Revision 16; CH-WAC Rev. 3; P.L. 102-579	Yes	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006). CCP representatives stated that none of the streams examined contained HLW.
AK-4: Are any wastes considered (or previously considered) Spent Nuclear Fuel? (P.L.102-579)	CCP-TP-005, Revision 16; CH-WAC Rev. 3; P.L. 102-579	Yes	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006). CCP personnel stated that none of the streams contained SNF.
AK-5: Are these defense-related wastes? (P.L.102-579)	CCP-TP-005, Revision 16; CH-WAC Rev. 3; P.L. 102-579	Yes	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006). Three waste streams of sealed sources containing ^{241}Am and ^{238}Pu have recently been given a defense determination by CBFO and the DOE Chief Counsel. All three streams are

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
			justified in the summaries as being defense waste based on the following argument: "Radioactive materials in the sealed sources are [from] activation of decay products of defense materials production, resulting from materials separations during defense nuclear material byproduct management, and are now managed [as defense waste] for defense nuclear materials security and safeguards." In essence, the material in the sealed sources is considered to be defense waste because it was created as part of "defense nuclear material byproduct management," even if the sources had a nondefense-related application. EPA does not make defense determinations.
AK-6: What is the scope of authorization sought (i.e., SCG, newly generated vs. retrievably stored, other site-specific breakdowns)	CCP-TP-005, Revision 16; CRA 2002	Yes	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006). Audit scope is retrievably stored S5000 debris and S3000 solid TRU waste. OSR waste (LANL-008) is considered newly generated debris.
AK-7: Is AK being 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)]	CCP-TP-005, Revision 16; CH-WAC Revision 3; P.L. 102-579	Yes	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006). BDRs for waste containers 850312 (Solids), S870375 (07), S814218 (solids), S834538 (^{238}Pu debris), S817225 (solids), 54631 HT 83, 55700 ^{238}Pu, LA00000061432, LA00000062374. Waste undergoes 100% NDA and NDE.
AK-8: Is AK being assembled as waste is generated after EPA approval of the QA program (newly generated)? Is this waste undergoing confirmation as per the CCA/CRA	CCP-TP-005, Revision 16; CH-WAC Revision 3; P.L. 102-579	Yes	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
(100% sampling)? [194.24(c)(2)-(5)]			AK-LANL-009 (March 9, 2006). Waste streams LANL-007 and 009 have "projected" waste generation into the future thus implying a newly generated debris component will be created. OSRP waste (LANL-008) is considered newly generated debris waste. 100% NDA and NDE is being performed on all containers.
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 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	CCP-TP-005, Revision 16; CCP-QP-002	Partial Verification, see Objective Evidence	Training records for Julia Whitworth (AKE), Kevin Peters (AKE), Steve Schafer (AKE), Mark Pearcy (SPM), and Randy Fitzgerald (SPQAO). Individuals were proficient as evidenced through interview, but additional EPA-specific training would help ensure consistent understanding of EPA requirements.

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
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)	CCP-TP-005, Revision 16; CCP-TP-101	Partial Verification; see Objective Evidence	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006). Procedure CCP-TP-005 includes newly generated and retrievably stored waste; OSRP wastes are characterized using AK as well as CCP-TP-101. Note that OSRP waste is entirely characterized prior to packaging.
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)	CCP-TP-005, Revision 16	Yes	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006), D041, D039, D074, D078 (004); D011, D014, D015, D032 (007); M055 (008); D028, M018 (009). Data included in the above references included information pertinent to types and quantities of wastes within the streams at this 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 plus any unexpected radionuclides	CCP-TP-005, Revision 16; Manual IS Revision 5	Yes	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006), C028, C019, D01, D025, D041, D044, D040, D035, D004, M018, M117

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
b. ferrous metals (in containers) c. cellulosics, plastics, rubber d. nonferrous metals (in containers) (CRA/CCA Ch 4 and Attachments/Appendices)			(004); C028, C032, C042, D011, D014, D015 (007); C010, C011, D007, M037, M036, M011, M010, M009 (008); D011, D021, D028, M019 (009). Radiological components are identified in various supporting documents. Note that the identification of WMPs to assign WMC is performed; detailed breakdowns with respect to CRA/CCA quantities not included in AK Summaries.
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)	CCP-TP-005, Revision 16	Yes	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006), C028, C019, D01, D025, D041, D044, D040, D035, D004, M018, M117 (004); C028, C032, C042, D011, D014, D015 (007); C010, C011, D007, M037, M036, M011, M010, M009 (008); D011, D021, D028, M019 (009). Process origin discussed. Note that CCP personnel stated that LANL-007 (MT 83) is a distinct process separate from the ^{239}Pu (006) stream; this was discussed because LANL-007 appeared to contain an occasional container with ^{239}Pu contrary to the process definition of the stream. In the case of LANL-004 is tied to numerous input streams; LANL-007 is associated with MT83 processing only; LANL-008 is newly generated OSRP waste, and LANL-009 is associated with various activities in CMR.
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)	CCP-TP-005, Revision 16	Yes	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006). Four separate waste streams were examined and AK summaries for each addressed the checklist element requirements.

ATTACHMENT A.1: ACCEPTABLE KNOWLEDGE (AK) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8 **Inspection Dates: May 23-25, 2006**

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
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)	CCP-TP-005, Revision 16	Partial Verification, see Objective Evidence	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006). Three waste streams of sealed sources containing ^{241}Am and ^{238}Pu have recently been given a defense determination by CBFO and the DOE Chief Counsel. CCP intends to assess whether new OSRP waste streams are warranted based on both the new defense determinations and the presence of irradiated sealed sources. If not, LANL-CCP will update the current AK summary with respect to radionuclide content, predominant nuclides, etc.; similarly, it will update or create a new WSPF to reflect this new approval. Because EPA has not assessed the radiological characterization for new sealed sources, examination of this approach is required to ensure that the processes proposed are technically adequate. Also, CCP has consistently used material types to demonstrate similar material components in waste streams, specifically LANL-007 and -006. Combination of these streams in contradiction with past waste stream definition practices requires prior EPA notification and approval.
AK-16: Do procedures demonstrate a logical progression from general facility information to more detailed waste stream-specific information?	CCP-TP-005, Revision 16	Yes	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006). Data were available to show programmatic to waste stream information.
AK-17: Does the process include review of AK information to evaluate and document AK-AK information discrepancies?	CCP-TP-005, Revision 16	Partial Verification, See Objective Evidence	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006), DR004 (004).

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
(CH WAC Section A.2.2.3, Attachment B4, Section B4-3)			DR005 (007), DR001, 0002, 004, 006-010 (008), DR003 (009). The discrepancy resolutions examined were complete (although this does not necessarily mean that EPA concurred with the resolution therein, for example, combining of waste streams, etc.). CCP had recently generated a number of discrepancy resolutions specific to the use of the NMMSS database for AK-008 Sealed sources, because the NMMSS database does not comport with other information with respect to sealed source radionuclide content. Tracking of discrepancies between the NMMSS database and other sealed sources' radiological content information is important to understand whether the NMMSS is still a reliable source of data, and is overall important because OSR relies entirely on AK for radiological characterization.
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)	CCP-TP-005, Revision 16	Yes, in part	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006). CTS/PTS CCP print outs, CWSR container storage record database discardable waste lot sheets DWLS (various examples), CONCERT database, NMMSS. Note that CCP tracks data on an uncontrolled AK tracking spreadsheet that includes container, MT, and other information (container status). CTS/PTS track data as well. Note that is difficult to follow the specific databases used; Chapter 6 of each AKS could include this listing. Data entry into WWIS was not examined.
AK-19: Is AK information compiled in an auditable record, including a road map for all applicable information?	CCP-TP-005, Revision 16	Yes	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006). Attachments 1 and 4 for CCP-TP-005 (prepared for each waste stream).

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
			Attachments correlate mandatory program and waste stream information with references to support the determination; Attachment 4 is a complete reference list for each 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)	CCP-TP-005, Revision 16	Partial Verification, See Objective Evidence	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006). Attachment 4 (CCP-TP-005) is a master reference list and is prepared for each stream. However, it is very difficult to track source documents between streams because they use common identifiers (e.g., there could be a reference D011 for LANL-004 and D011 for LANL-009, but the references are different). It is recommended that some sort of unique identifier be added to each reference indicating the waste stream it applies to, as the same reference list numbers are used in different reports to identify different references, which can lead to confusion.
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: - Area(s) or building(s) from which the waste stream was or is generated - Estimated waste stream volume and time period of generation	CCP-TP-005, Revision 16	Yes	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006). C028, C019, D01, D025, D041, D044, D040, D035, D004, M018, M117 (004); C028, C032, C042, D011, D014, D015 (007); C010, C011, D007, M037, M036, M011, M010, M009 (008); D011, D021, D028, M019 (009). Radiological information is also summarized in AK-NDA memoranda for CCP-AK-LANL-004, 007, and 009 (no AK-NDA memorandum prepared for 008). Information presented identified the specific programmatic and waste stream information required in this checklist item. The physical/chemical information that could affect isotopic distribution

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
- 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 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 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)			should be addressed in AK-NDA memoranda. Isotopic ratios could not be assigned for waste stream LANL-004; isotopic data are assembled on a drum specific basis for containers in streams LANL-008 and 009. MT 83 isotopics are assigned to LANL-007.
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	CCP-TP-005, Revision 16	Yes	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006). C028, C019, C061, D005, D025, D039, D041, D034, D082, D051, D044, D035, D018, M117 (004); C032, C040, C041, D011, D014, D015, D032, P016 (007); M024, M001, D007, M040, M036, M026 (008); D001, D003, D010, D021, D028, M018, M019 (009). Supplemental information was available for many of the examples listed.

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
• 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 • 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)	CCP-TP-005, Revision 16	Partial Verification, see Objective Evidence	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006). Supplemental Information assembled appeared to be appropriately used at this point, although the combination of combustible/non combustible waste streams by CCP appears to be based on the desire to increase waste stream size, and it is unclear whether the justification for this combining of streams will hold true through the process.
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)	CCP-TP-005, Revision 16; CH-WAC Rev. 3	Partial, see Objective Evidence	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006), M025 (004); D015, D032, D033 (007), D029 (009). CCP explicitly defined CCP-AK-LANL-007 as consisting *only* of ^{238}Pu debris waste; if ^{239}Pu were to be detected in drums assigned to this stream, CCP representatives said the drums would be segregated for inclusion in another waste stream. When asked whether the ^{239}Pu containers could be placed in AK-006, CCP personnel

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
			stated that this was not an option, apparently due to how the waste streams were assigned. However, the AK personnel indicated they were considering broadening the definition of this waste stream to allow the inclusion of an occasional drum with isotopics not represented by MT 83, but at the time of the inspection this had not been accomplished. CCP has determined that AK-006 and AK-007 are different waste streams based on the definition of waste streams presented in the Waste Analysis Plan (WAP) and WAC. EPA agrees that they are separate waste streams, and post inspection modification or combinations of waste streams examined by EPA during its inspection would require revisiting and approval by EPA. Also, Approval of ^{239}Pu and ^{241}Am sealed sources as defense waste makes these wastes eligible for disposal at the WIPP; correct waste stream determination is expected.
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)	CCP-TP-005, Revision 16	Yes	All Source Documents examined (M, C, P, D). CCP-TP-005 Attachment 3 Acceptable Knowledge Source Document Summary. This attachment is completed and placed atop each reference; the attachment includes a location where AK source document limitations are documented.
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)	CCP-TP-005, Revision 16	Yes	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009, (March 9, 2006). AK Summaries examined were comprehensive and addressed most technical information needs. Examined supporting references were sufficient for the specific items they were reviewed to assess. The following items were identified:

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
			Remove Wing 1 discussion from Table 10 of LANL-009 and revise the text accordingly; Include waste stream generation dates in LANL-007 in an appropriate location(s); Ensure that all discussion of 10 WIPP-tracked radionuclides as well as any other radionuclides expected are addressed as "expected" rather than "suspected," because this impacts how site personnel enter the data into the WWIS; Examine WMP and prohibited item discussions to ensure that an accurate description of the wastes is presented. For example, for AK-004, the AK summary indicates that fluids may be present through dewatering and condensation, but it does not indicate where, specifically, this water may be in the containers; Clarify the language pertaining to heat source fabrication. AK-007 includes several different current and historic ^{238}Pu waste generation processes, but it is hard to identify which of the processes are active versus those that are not, in large part because the language pertaining to heat source fabrication is confusing; Always distinguish "expected" versus "suspected" radionuclides in radiological discussions; it is important to identify "expected" radionuclides as this impacts how site personnel enter radionuclide data into the WWIS (e.g., ^{233}U as presented in AK-007); AK documents address some prohibited items, but do not specify where in the waste those items might be. For example, liquid from condensation or dewatering was identified in AK-004, but the anticipated location of this water in the containers was not specified. This

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
			turned out to be important, as liquid was identified in the wastes (at the bottom and in containers within drums), not just at the top or along the sides of the containers as might be anticipated through condensation/dewatering. AK should be more specific, if possible, as to the location of liquid within waste. CCP-TP-005, Attachment 3, presents AK data limitations. Attachment 3 is included on front of all CCP C, D, P, and M documents. This form addresses each source document, and therefore each source document includes a source document data limitation assessment. Attachments 1 and 4 to CCP-TP-005 act as AK "roadmaps" in that they present specific supporting documents and spell out the relevancy of those documents to required AK elements.
AK-27: Are conclusions and interpretations presented in the AK Summary technically sound and supported by referenced mandatory and supplemental information?	CCP-TP-005, Revision 16	Partial Verification, see Objective Evidence	See reference lists and discussion under AK-21, AK-22, AK-23, AK-25 and AK-26.
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)	CCP-TP-005, Revision 16	Partial Verification, see Objective Evidence	See references and discussion under AK-17. As indicated in this AK item, several discrepancies were identified that bring to question the reliability of the NMMSS database. CCP is encouraged to examine these discrepancies in detail, since OSR relies solely on AK for radiological characterization data.
AK-29 : Is load management proposed? Does the AK Summary include the following from the CH WAC, Rev 3 Appendix E?	CCP-TP-005, Revision 16	Partial Verification, see Objective Evidence	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006). Load management is

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
• 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 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)			being sought only for AK-009, Waste Stream LA-MHD03.001, CMR facility heterogeneous debris waste. Between 3–33% of this waste stream is expected to be less than 100 nCi/g on a container basis. CCP will not use load management for AK-004, AK-008, and AK-007 at this time. If CCP decides to use load management for these waste streams, it must meet the requirements of Appendix E of the CH-WAC, Revision 3.
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)	CCP-TP-005, Revision 16	Yes	NCR-LANL-0537-05, NCR-LANL-0742-06, NCR-LANL-0803-05, NCR-LANL-0516-06 (stream unclear). NCRs show that CCP is capable of identifying nonconforming items; the specific stream associated with NCR-LANL-0516-06 should be identified as this deals with NDA/AK mismatches.
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)	CCP-TP-005, Revision 16	Yes	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006). See AK 28 and 10. The necessary information has been available so far.
CONFIRMING AK INFORMATION WITH OTHER ANALYTICAL RESULTS			
AK-32: Do these procedures facilitate the mandatory traceability analysis performed for each Summary Waste Category Group examined during the audit, noting that EPA will determine whether the available waste streams adequately demonstrate the full characterization process	CCP-TP-005, Revision 16	Yes	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006). EPA examined traceability in whole or in part for several

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
for the proposed scope? (Attachment B4, Section B4-2)			containers—S850312 (solids), S870375 (stream ^{238}Pu debris), S814218 (solids), S834538 (^{238}Pu debris), S817225 (solids), 54631 MT 83, 55700 ^{238}Pu, OSR LA00000061432, and OSR LA00000062374. Information for evaluated containers was traceable from original LANL radioactive solid waste disposal forms, radioactive solid waste disposal records, or similar forms through the current AK spreadsheet to BDRs generated through WIPP characterization and subsequent tracking in PTS/CTS. EPA did not assess input into the WWIS as part of AK.
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 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)	CCP-TP-005, Revision 16, CH-WAC, Revision 3	Partial Verification, see Objective Evidence	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006). AK-NDA Memoranda for LANL-004, 007, and 009. LA-MIN03-NC.001, TA-50 Homogenous Inorganic Solids Noncemented Waste (AK-004). No default isotopics are available for this waste stream due to the manner in which the stream was created. Therefore, comparison of measured and AK values to confirm any plutonium isotopes cannot be performed. Similarly, while uranium information was tracked from an AK perspective in waste since 1985, the use of "valid AK" to confirm U measurements is not appropriate. CCP identified ^{235}U and ^{239}Pu as the two prevalent isotopes by weight. CCP did not indicate a specific point at which this assessment would be reconsidered to accurately evaluate this initial determination. Furthermore, determination of predominant radionuclides by activity rather than weight is more meaningful for the cumulative tracking of the total activity of each of the 10 WIPP-tracking radionuclides measured in the waste.

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
• ^{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 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 via comparison of ^{241}Am peak at 662 keV to 722 ^{241}Am peak, i.e., a disproportionate response 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)			LA-MHD02.001, ^{238}Pu Contaminated Mixed Heterogeneous Debris Waste (AK-007). AK defined this waste stream as consisting entirely of MT 83, so the waste's isotopic ratios are well defined. Because NDA personnel know that this waste stream consists of ^{238}Pu, they use the specified isotopic ratios for MT83 to determine Pu contents. If measured values don't match MT83, CCP representatives stated that the drums are not part of this waste stream and are segregated for assignment to a new waste stream. With respect to uranium, little ^{233}U is anticipated, and it is therefore an "expected" rather than a "suspected" nuclide. LA-OS-00-01.001, OSRP Sealed Sources (AK-008). AK is the exclusive means for determining the radionuclide content of sealed sources. Therefore, for each source, site personnel assess NMMSS, source certificates, fabrication/shipping records, U.S. Nuclear Regulatory Commission registry information, and other data, to determine the precise radionuclide content of waste at the time of fabrication, which is then corrected for radiological decay and/or ingrowth, as appropriate. In addition to sealed sources for which AK has already been assessed, CCP representatives stated additional irradiated sources are present that will therefore have an initial composition different than that assigned by the manufacturer. EPA expects to examine both new OSRP waste streams based on newly approved defense waste and irradiated sources prior to shipment. LA-MHD03.001, CMR Facility Debris (AK-009). Site personnel assigned MTs to each container upon waste generation. NDA personnel get AK data from the AKE for each container to assist in NDA measurements. For example, NDA personnel may

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
			need to know whether MT 83 is present based on AK; MT 42 (^{242}Pu) mixtures are also important to identify. AKE may determine weighted average by material type(s) for use by NDA on a drum basis. Confirmation with respect to weapons versus heat sources as described in the WAP apparently does not take place; instead, the AKE indicated that verification might take place on an MT basis. The AKE indicated that ^{241}Pu was determined by AK as opposed to by calculation based on measured ^{241}Am values, as indicated in the WAC; ^{241}Pu is not a TRU radionuclide or one of the 10 WIPP-tracked radionuclides. MGA or FRAM calculate ^{242}Pu as part of the NDA process but site operators often use AK, particularly when AK identifies drums as containing high quantities of ^{242}Pu. AK used to help determine ^{234}U content on a drum-by-drum basis; a scaling factor is used to determine the ^{234}U content based on the observed ^{235}U. The AK memorandum states that ^{234}U is quantified by calculation, and it provides the formula and assumptions for the HENC. Note that EPA observed inconsistency in radionuclide presentation and reporting. For example, it is important to distinguish radionuclides that are "expected" because this directly impacts how site personnel enter the information for these radionuclides in the WWIS. For example, ^{233}U is expected in waste stream LANL-007. In all instances "conservative" assumptions must take into account requirements of the CRA.
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))	CCP-TP-005, Revision 16	Yes	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006). See Item AK-6, above.

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
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)	CCP-TP-005, Revision 16	Yes	AK Re-Evaluation Checklists, CCP-TP-005 Attachment 10. Checklists are prepared when re-evaluation of AK is required based on NDE results. It is unclear whether CCP representatives did not indicate whether *Fastscan* or *Quickscan* is being performed. If so, data must be in the AK record.
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)	CCP-TP-005, Revision 16	Yes	See VE checklists for evaluation of visual examination/ technique analysis.
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 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	CCP-TP-005, Revision 16	Yes	CCP-AK-LANL-004 (March 9, 2006), CCP-AK-LANL-007, Revision 2 (April 13, 2006), CCP-AK-LANL-008, Revision 3, (September 22, 2005); CCP-AK-LANL-009 (March 9, 2006). Attachment 10 of CCP-TP-005. No examples of this process were provided; see item AK-35, above.

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
• 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)	CCP-TP-005, Revision 16	Partial Verification, see Objective Evidence	AKE did not calculate the MPC based on AK/NDE. AK summaries include general information pertaining to the WMP content of the streams. CCP sometimes calculates WMP content based on individual drum data, if available. CCP elected to combine combustible and noncombustible debris from two streams into one (LANL-007). Although LANL continues to differentiate wastes as being combustible or non combustible, CCP representatives do not have confidence in these values and therefore believe it more appropriate to combine the two streams. CCP often combines distinguishable waste streams into larger groupings to decrease the number of WSPFs needed. In this instance, EPA received no information as to why the sites separated or continue to separate the waste based on these constituents (i.e., why LANL distinguishes two separate waste streams while CCP does not).
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?	CCP-TP-005, Revision 16, Section 4.4.20	Partial Verification, see Objective Evidence	AK-NDA memoranda for LANL-004, LA-MIN03-NC.001, TA-50 Homogenous Inorganic Solids Non-cemented Waste (AK-004); LA-MHD02.001, ^{238}Pu Contaminated Mixed Heterogeneous Debris (AK-007), and LA-MHD03.001, CMR Facility Debris (AK-009). AK limitations are identified on all source

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
• Are AK data and associated 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)			documents Attachment 3 (Pu, U, M, C). The AK-NDA memoranda communicate AK data use and limitations to the NDA personnel; AK is used differently for each waste stream (discussed below). Dual signature on AK-NDA memorandum shows that both AK and NDA personnel are aware of its contents. LA-MIN03-NC.001, TA-50 Homogenous Inorganic Solids Non-cemented Waste (AK-004): memorandum indicates composition highly complex and there are no default isotopics-determination of composition determined via measurement only. LA-MHD02.001, ^{238}Pu Contaminated Mixed Heterogeneous Debris (AK-007). This is only MT 83 and is tightly controlled by process, so NDA assumes only this in stream with little consultation with AK. LA-OS-00-01.001, OSRP Sealed Sources (AK-008). OSR characterized entirely using AK based on information from various sources, including the NMMSS, source certificates, shipping documents, and manufacturer's shipping records. No NDA used so there is no NDA-AK communication. LA-MHD03.001, CMR Facility Debris (AK-009). Waste generated from this facility originated from a number of different laboratory areas and MT types (MT 52, 54, 83, 39). The generators documented the specific MT in each waste container for more than 97% of the individual containers (unlike AK-004) so NDA personnel communicate constantly with AK personnel to obtain drum specific nuclide assignments. The NDA-AK memoranda have inconsistencies, as listed below:

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
			1. The LANL-004 NDA-AK memorandum includes editorial issues with respect to appropriate units and inadequate referencing of support documents for specific statements or conclusions. 2. In the NDA memoranda for LANL-007 and -009, references for formulas or other calculations are lacking. 3. Tables in all NDA-AK memoranda are not matched against data in the AK summaries and attachments to ensure data consistency; specifically, Table 3 in the LANL-009 NDA-AK memorandum is erroneous and should be revised to indicate expected (rather than suspected) radionuclides, as this affects how site personnel enter the nuclides into the WWIS.
AUDITING OF AK RECORDS AND AK DISCREPANCY IDENTIFICATION/RESOLUTION			
AK-40: Have internal audits been performed? (Attachment B4, Section B4-3e)	CCP-TP-005, Revision 16	Yes	Management Assessment Report MA-CCP-0002-05, Maintenance of Acceptable Knowledge Data, July 20 2005.
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)	CCP-TP-005, Revision 16	Yes	CCP-AK-LANL-004. While not formally revoked, the presence of liquid was identified in drums, and the potential for water within already-shipped drums was raised. See VE checklist for additional information.
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, Sections B4-3b, B4-3d)	CCP-TP-005, Revision 16	Partial Verification, see Objective Evidence	No example available to date.. However, sites should establish general criteria for entire stream re-evaluation to address this requirement, noting that many streams are relatively mature with respect to the characterization process.

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
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 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	CCP-TP-005, Revision 16	Partial Verification, see Objective Evidence	Acceptable Knowledge Accuracy Report, LANL No. LA-0S-00-01, Lots 1-5, AK Accuracy Report, Los Alamos National Laboratory Waste Stream LA-MHD01.01, Lots 1-26 (LANL-06), December 20, 2005, Acceptable Knowledge Accuracy report: LANL Waste Stream No.LA-MIN03-NC.001, Lots 1-15, dated March 27, 2006. [LANL-004] Development of criteria for reassessment of AK accuracy based on radionuclide results is important, and EPA recommends that CCP develop these criteria. Also, determination of most prevalent nuclides by mass and activity should be considered (not just mass) as the CH WAC does not specify which and CCP should use the most meaningful comparison. See item 38 for data limitations. .

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
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 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)	CCP-TP-005, Revision 16	Yes	CCP-TP-005 Attachment 13, AK Confirmation Checklist (Attachment 13). CCP documents confirmation results via this checklist. Internal assessments are performed (see Item AK-40, above).
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:	CCP-TP-005, Revision 16	Partial Verification, see Objective Evidence	NCR-LANL-0537-05, NCR-LANL-0742-06, NCR-LANL-0803-05, NCR-LANL-0516-06 (stream unclear). It is unclear whether Quick or Fast Scan being used as a process control; should include in AK Records. It should be noted that CCP AK personnel have noted little confidence in site process controls to eliminate prohibited items such as water, and have

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
• 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 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)			couched this discomfort in AK documents by making relatively non-committal statements regarding prohibited item occurrence.

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
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)	CCP-TP-005, Revision 16	Yes	The TWBIR delineates Waste Profiles that are sometimes used as a starting point for assigning and determining waste streams. No state-enforced agreements or permit requirements were identified during the inspection that impact waste stream determination.

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #1 (LANL HENC #1)

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	NA	The system is the LANL-HENC #1, previously known as the MCS HENC. It is housed in Building No.54506 (trailer) located Technical Area 54 (TA 54), Area G, Pad 10 at LANL. The system has not been moved since the last EPA inspection.	Y	Visual observation of the LANL HENC #1 system in place at Area G of TA-54 at LANL.
Describe the system's operational history including deployment at other DOE sites.	NA	NA	The LANL-HENC #1 was initially deployed at LLNL and was first evaluated during EPA-LLNL-CCP-04.08.8, August 2004, and more recently during EPA-LANL-CCP-04.05-8 in April 2005.	Y	EPA Waste Characterization Reports: EPA Inspection Nos. EPA-LANL-CCP-05.05.8, May 2005; EPA-LLNL-CCP-05.04-8, May 2004
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	NA	The LANL-HENC #1 has been modified as follows: addition of a Cd filter; removal of sludge drum data from the system calibration in response to PDP related problems; and, recalculation of the efficiency to address gamma attenuation in the calibration sources.	Y	Visual inspection of LANL HENC #1; *Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 4
SYSTEM PERFORMANCE					
Identify the period of performance relevant to this inspection and if this NDA system has prior EPA approval(s).	NA	NA	The period of performance relevant to this inspection is April 15, 2005 to March 31, 2006, and March 31, 2006 to March 6, 2007	Y	EPA Inspection Letters to D. Moody: April 6, 2006 outlining scope of EPA-LANL-CCP-05.06-8; February 8, 2007, outlining scope of follow-up inspection at LANL-CCP
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	NA	During the time period of interest 3589 assays of 55-gallon (208 liter) drums have been conducted, including PDP drums and EPA replicates. These results have been compiled in a total of 351 BDRs.	Y	Information provided by S. Stanfield during inspection.

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #1 (LANL HENC #1)

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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	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	BDRs LANDA0124, LANDA0361, 1LANDA0390, LANDA0227
Each container characterized and intended for disposal at WIPP must contain TRU waste.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Containers assayed for WIPP are TRU waste, i.e., they contain >100 nCi/g of transuranic alpha activity.	Y	BDRs LANDA0124, LANDA0361, 1LANDA0390, LANDA0227
NDA instruments and procedures are appropriate for the waste streams being assayed.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The LANL HENC #1 and supporting procedures are appropriate for the wastes currently being assayed.	Y	BDRs LANDA0124, LANDA0361, 1LANDA0390, LANDA0227
NDA instruments and procedures result in unbiased values for the cumulative activity of the WIPP radionuclide inventory.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The radionuclide values produced by the LANL HENC #1 are appropriate for supporting the cumulative activity of the WIPP radionuclide inventory.	Y	BDRs LANDA0124, LANDA0361, 1LANDA0390, LANDA0227
Some radionuclides are derived by the application of scaling factors or correlation techniques. Identify all radionuclides that are quantified in this manner.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	^{234}U, ^{242}Pu and ^{90}Sr are derived by the application of scaling and/or correlation factors.	Y	CCP-TP-103, Revision 6, Appendix 1, pages 15 - 24
Assess the technical adequacy of the calculations involving the application of scaling factors and/or correlation techniques.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The scaling and/or correlation factors cited in the preceding checklist item are technically adequate and appropriately documented.	Y	CCP-TP-103, Revision 6, Appendix 1, pages 15 - 24
Identify the procedures that govern this function and where the results of these calculations are documented.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The procedure that governs the application of scaling factors is identified and the results of these calculations are documented.	Y	CCP-TP-103, Revision 6, Appendix 1, pgs. 15 – 24; BDRs LANDA0124, LANDA0361, 1LANDA0390, LANDA0227
ACCEPTABLE KNOWLEDGE (AK)					

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #1 (LANL HENC #1)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
If isotopic ratios based on AK are used the values are qualified by confirmatory testing.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Isotopic ratios used in quantifying radionuclides are qualified by confirmatory testing when AK is used	Y	CCP-TP-103, Revision 6, Appendix 1, pages 15 – 24
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	NDA personnel using AK derived isotopic values to calculate radionuclide values do so according to a formal procedure the technical adequacy of which is adequate.	Y	CCP-TP-103, Revision 6, Appendix 1, pages 15 – 24
Identify the procedure and where the results of these calculations are documented.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The procedure for AK calculations is identified and results of these calculations are documented in the LANL HENC #1 BDRs.	Y	CCP-TP-103, Revision 6, Appendix 1, pages 15 – 24; BDRs LANDA0124, LANDA0361, 1LANDA0390, LANDA0227
ISOTOPIC DETERMINATION					
Identify the radionuclides that are measured directly and the specific radiation type (gamma, AN or PN) that is measured.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	$^{240}Pu_{EFF}$ is directly measured based on passive neutron emission. Other radionuclides (^{238}Pu, ^{239}Pu, ^{241}Am, etc.) are derived from $^{240}Pu_{EFF}$ based on isotopics determined by gamma-based MGA or by a direct gamma determination, as appropriate.	Y	*Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation,* Revision 2
Identify the method(s) used to derive the isotopic contribution for the unmeasured radionuclides, e.g., MGA, PC FRAM or other technique.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	MGA is used to derive the isotopic contribution for unmeasured radionuclides. All containers (100 percent) are subject to routine gamma assay although useable data may not be available for each container. AK-based isotopic values are used in the absence of useable MGA values when data to support AK are documented in AK/NDA Memoranda.	Y	*Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 2; CCP-AK-LANL-009 AK/NDA Memorandum, Revision 0; Memorandum from W. Estill re: *Evaluation of the Radiological Characterization of LA-MIN03-NC Waste Stream*

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #1 (LANL HENC #1)

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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The LLD for the LANL HENC#1 has been determined for the passive neutron and gamma modes.	Y	MCS-HENC#1-NDA-1002, Revision 4, Tables 7a, 7b, 7c and 7d
Site-specific environmental backgrounds and container-specific interferences must be accounted for in LLD determinations.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Site-specific environmental backgrounds and container specific interferences are accounted for in LLD determinations.	Y	MCS-HENC#1-NDA-1002,
NDA instruments performing TRU/Non-TRU waste discrimination measurements are required to have a LLD no greater than 100 nCi/g.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Both the passive neutron and gamma modes have LLDs less than 100 nCi/g for debris and solid matrices	Y	MCS-HENC#1-NDA-1002, Revision 4, Tables 7a, 7b, 7c and 7d
The technical basis and derivation for LLDs must be adequate and appropriately documented.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The technical bases and derivation for the passive neutron and gamma modes are technically adequate and appropriately documented.	Y	*Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 4, Section 7
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	A reporting threshold (LLD analog) has been determined for ^{90}Sr, ^{234}U and ^{242}Pu. These are technically adequate and appropriately documented.	Y	*Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 4, Section 7
Identify any/all instances where an LLD value for a *non-measured* radionuclide is not provided basis on a lack of technical feasibility.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	There are no instances where a LLD value for a *non-measured* radionuclide is not provided basis on a lack of technical feasibility are documented.	NA	Not Applicable

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #1 (LANL HENC #1)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The LLD values listed in MCS-HENC#1-NDA-1002, Revision 4, Tables 7a, 7b, 7c and 7d are typical values that demonstrate the LANL HENC #1's sensitivity with the understanding that these values listed may not be obtained for every assay event.	Y	*Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 4, Section 7
TOTAL MEASUREMENT UNCERTAINTY (TMU)					
The method used to calculate the TMU for all required quantities must be documented and technically justified.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The method used to calculate the TMU for the LANL HENC #1 is documented and technically justified.	Y	*Total Measurement Uncertainty for the MCS HENC #1 With Integral Gamma Spectrometer*, Document #CI-HENC-TMU-101, Revision 1, March 24,2005
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The TMU determined and documented for the LANL HENC #1 includes all required elements.	Y	*Total Measurement Uncertainty for the MCS HENC #1 With Integral Gamma Spectrometer*, Document #CI-HENC-TMU-101, Revision 1, March 24,2005

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #1 (LANL HENC #1)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
Methods to determine TMU must be documented, reviewed and approved by CBFO for each NDA instrument.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	CBFO Technical Specialist D. Stuenkel confirmed that the TMU report had been reviewed and approved.	Y	Oral communication with D. Stuenkel and CCP issuance of controlled copy of TMU report.

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #1 (LANL HENC #1)

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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The LANL HENC #1 was originally calibrated in 2004. There have been four revisions to the calibration report and each was available. The system's current calibration is documented in Revision 4. The passive neutron and gamma calibrations are technically adequate.	Y	*Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 2; *Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 4
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The operating range is the system LLD to 16.278 g $^{240}Pu_{EFF}$ for passive neutron; LLD to 217 g Pu total for gamma, but gamma range is best expressed as 122 to 1408 keV, limited by dead time. Matrix density range for gamma is 0.018 to 1.64 g/cc and is suitable to S3000 and S5000 wastes.	Y	*Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 4
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Matrix/source waste combinations are representative of routine samples currently measured by the LANL HENC #1. The system is calibrated to 100% recovery.	Y	*Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 4
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Consensus standards have been used for calibrating the LANL HENC #1, see checklist item below.	Y	*Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 2

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #1 (LANL HENC #1)

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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The specific consensus standards used for calibration are: ASTM-C1030-95, ASTM C-1133-96, ASTM C-1207 and ASTM C-1500.	Y	*Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 2
Primary standards must be obtained from suppliers maintaining a nationally accredited measurement program. Identify the nationally accredited measurement program.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Primary gamma standards have been obtained a commercial supplier; Pu sources for passive neutron calibration were obtained from R. Marshall's group in the LANL CMR. Both organizations maintain a nationally accredited measurement program.	Y	
List the standards used for calibration and verify the pedigree of each standard.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The calibration standards are listed and the pedigree of each has been verified.	Y	
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The LANL HENC #1 has been recalibratied several times since the system's initial calibration in at LANL in 2004. Each recalibration has been confirmed and documented appropriately as discussed above in this checklist.	Y	*Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 4
Recalibration of the system must occur if the calibration verification demonstrates that the system's response has significantly changed.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Recalibration of the system has been performed if the calibration verification demonstrated that the system's response has significantly changed and the recalibration has been documented.	Y	*Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 4

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #1 (LANL HENC #1)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
The system calibration must be confirmed by performing replicate measurements of a non-interfering matrix.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The LANL HENC #1's calibration has been confirmed and documented appropriately following each calibration.		*Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 4
Replicate measurements must be performed with containers of the same nominal size and according to the same procedures used for actual waste assays.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Replicate measurements have been performed with 55-gallon (208 liter) drums and the operating and data review procedures that are used for routine waste assays.	Y	*Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 4; CCP-TP-064; CCP-TP-063; CCP-TP-103
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Replicate measurements have been performed with appropriate standards that span the operational range of use of the LANL HENC #1 with respect to activity and matrix. All standards that were used for confirmation have been identified in the calibration report. See next checklist item, below.	Y	*Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 4
Identify the nationally accredited measurement program. List the standards used for verification/confirmation and verify the pedigree of each standard.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Standards are listed in the calibration report. The LANL program's standards are derived from nationally recognized NIST standards.		*Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 4
The standards used for calibration confirmation must not be the same sources		CCP-PO-001,*CCP Transuranic Waste Certification Plan,*	The standards used for calibration confirmation are different from those used		*Supplemental Calibration Report for the MCS HENC #1 Including*

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #1 (LANL HENC #1)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
as those used for the system's calibration of record.		Revision 11	for the system's calibration of record.		*Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 4
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.		CCP-PO-001,*CCP Transuranic Waste Certification Plan*, Revision 11	Requirements for accuracy and precision have been met as specified in DOE/WIPP-02-3122, Appendix A, Table A-3.2 for precision and ±30% for accuracy.		

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #1 (LANL HENC #1)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
QUALITY CONTROL					
All radioassay functions and data validation must be performed by appropriately trained and qualified personnel.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	All radioassay functions and data validation have been performed by personnel who are appropriately trained and qualified.	Y	CCP-LANL List of Qualified Individuals, 5/22/2006, 10:30 AM provided during inspection
Identify the name, title and function of all personnel performing NDA data validation.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The name, title and function of all NDA personnel performing data validation for the LANL HENC#1 are documented.	Y	CCP-LANL List of Qualified Individuals, 5/22/2006, 10:30 AM provided during inspection
Requalification of personnel must be based on evidence of continued satisfactory performance and must be performed at least every two years.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Requalification of personnel be based on evidence of continued satisfactory performance has been performed at least every two years.	Y	CCP-LANL List of Qualified Individuals, 5/22/2006, 10:30 AM provided during inspection
The site must participate in relevant measurement comparison programs sponsored or approved by CBFO, including the NDA PDP.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The site has participated successfully in Cycle 13A of the CBFO sponsored NDA PDP. The conditional approval of the LANL HENC #1 effective in July 2006 was made permanent upon successful implementation of the LANL Corrective Action Plan that addressed the Cycle 13A PDP failures for the glass matrix container with HS Pu.	Y	July 19, 2006 Memorandum from M. Brown to C. Fesmire *Scoring Results – Primary Cycle 13A Nondestructive Assay PDP;* January 19, 2007 Memorandum from M. Brown to C. Fesmire updating status based on results of NDA PDP Primary Cycle 13A
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	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Daily background are taken and recorded. Contributions to backgrounds from high activity containers that are stored or staged in proximity to the LANL HENC #1 Trailer do affect the background but NDA	Y	*Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*. Revision 4: BDRs

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #1 (LANL HENC #1)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
applicable. Contributions to backgrounds from nearby radiation sources must be carefully controlled, or more frequent backgrounds must be measured.			personnel control this.		LANDA0124, LANDA0361, 1LANDA0390, LANDA0227
Assess how often background radiation was problematic to the extent that measurement personnel had to make adjustments.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Background control charts are used to document the system's performance over time.	Y	*Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 4; BDRs LANDA0124, LANDA0361, 1LANDA0390, LANDA0227
Identify the criteria used to evaluate instrument backgrounds and assess the technical adequacy of this criterion, i.e., statistical or administrative.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Backgrounds are evaluated against predetermined upper and lower boundaries and are non-statistical in nature. Initial control limits are based on the system's first month of operations and each day's measurements are automatically compared to the established limits	Y	*Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 4; BDRs LANDA0124, LANDA0361, 1LANDA0390, LANDA0227
Identify the number of data points required to derive the initial control limit. At what interval(s) will new limits be calculated?	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Initial control limits for all performance measurements were based on six measurements. Limits will be recalculated as more data are acquired or the system is recalibrated.	Y	*Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 4
System performance checks must be performed at least once per operational day.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Performance checks have been performed at least once per operational day and all checks have been documented.	Y	BDRs LANDA0124, LANDA0361, 1LANDA0390, LANDA0227

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #1 (LANL HENC #1)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
System performance checks must include, as applicable, efficiency, matrix correction checks, and systems peak position and resolution for spectrometric systems.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Performance checks include: 121 keV peak centroid and FWHM, 964 peak centroid and FWHM and weighed average of ^{152}Eu activity.	Y	*Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 4; BDRs LANDA0124, LANDA0361, 1LANDA0390, LANDA0227
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Two matrix drums are available, a debris and homogeneous solid. They are used with a variety of PDP-type Pu sources that span a range of activity. The acceptance criteria for the Weekly Interfering Matrix checks were not apparent during this inspection.	Y	*Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 4; BDRs LANDA0124, LANDA0361, 1LANDA0390, LANDA0227
Interfering surrogate waste matrices must be constructed in a way that the salient matrix characteristics do not change over time.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Interfering surrogate waste matrices have been constructed such that the salient matrix characteristics do not change over time.	Y	Visual examination of matrix drums, interviews with LANL-CCP NDA personnel and evaluation of PDP submittals
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The ^{241}Am, ^{152}Eu and Pu sources used for performance checks are of sufficient activity to provide statistically sufficient results over a short measurement time.	Y	Interviews with LANL-CCP NDA personnel and evaluation of LANL HENC #1 performance data and LANL HENC #1BDRs.
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The ^{241}Am and ^{152}Eu sources are decay corrected as a function of their physical half life. Decay correction is not applicable to ^{239}Pu sources.	Y	Interviews with LANL-CCP NDA personnel and evaluation of LANL HENC #1 performance data and BDRs.

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #1 (LANL HENC #1)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
Performance checks must be quantitative and based on 2 and 3 sigma limits.		CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Limits are based on *Student t-test* for 95% (warning limit) and 99% (control limit) confidence intervals.	Y	CCP-TP-103; *Supplemental Calibration Report for the MCS HENC #1 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 4; LANL HENC #1 BDRs LANDA0124, LANDA0361, 1LANDA0390, LANDA0227

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #1 (LANL HENC #1)

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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Individual Radioassay Data Sheets (RDS) were reviewed, as indicated. All were acceptable.	Y	LANL HENC #1 BDRs: LANDA0124, LANDA0361, 1LANDA0390, LANDA0227
Identify the name, title and function of the individual(s) performing technical review and approval of NDA BRDs.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The name, title and function of the individual(s) performing technical review and approval of NDA BRDs are documented.	Y	LANL HENC #1 BDRs: LANDA0124, LANDA0361, 1LANDA0390, LANDA0227
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The LANL HENC #1 BRDs reviewed during this inspection contained all required elements.	Y	LANL HENC #1 BDRs: LANDA0124, LANDA0361, 1LANDA0390, LANDA0227

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #1 (LANL HENC #1)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
Radioassay data sheets must include: • Title "Radioassay Data 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	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The LANL HENC #1 RDSs evaluated during this inspection included all required elements.	Y	Reviewed RDSs as follows: HENC #1 BDR Container No. LANDA0361: S844320, S3609 LANDA0124: 60706, 59129 1LANDA0390: 57014, 56897
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Nonpermanent records are maintained in the LANL HENC #1 trailer in TA-54, Area G, and all raw data are included on two compact discs that are submitted with each BDR to the CCP office.	Y	Interviews with LANL HENC #1 operator and other LANL-CCP NDA personnel.

ATTACHMENT A.3: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #2 (LANL HENC #2)

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	NA	The system is the LANL-HENC #2 and is located at Technical Area 54 (TA 54), Building 498, Area G, Pad 10 at LANL. This is the first EPA inspection of this system.	Y	Visual observation of the LANL HENC #2 system in place at Area G of TA-54 at LANL.
Describe the system's operational history including deployment at other DOE sites.	NA	NA	The LANL-HENC #2 was initially deployed at LANL and was previously operated under the LANL WIPP program.	Y	*Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0
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	NA	This is the initial EPA inspection of the LANL HENC #2.	Y	Visual inspection of LANL HENC #2; *Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0
SYSTEM PERFORMANCE					
Identify the period of performance relevant to this inspection and if this NDA system has prior EPA approval(s).	NA	NA	The period of performance relevant to this inspection is the system's initial calibration to March 31, 2006, and March 31, 2006 to March 6, 2007	Y	EPA Inspection Letters to D. Moody: April 6, 2006 outlining scope of EPA-LANL-CCP-05.06-8; February 8, 2007, outlining scope of follow-up inspection at LANL-CCP
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	NA	During the time period of interest 218 assays of 55-gallon (208 liter) drums have been conducted, including PDP drums and EPA replicates. These results have been compiled in a total of 20 BDRs.	Y	Information provided by S. Stanfield during inspection.

ATTACHMENT A.3: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: **EPA-LANL-CCP-05.06-8**
Inspection Date: **May 23 – 25, 2006**
NDA System: **LANL High Efficiency Neutron Counter #2 (LANL HENC #2)**

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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	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	HENC #2 BDRs 2LANDA0002, 2LANDA0005, 2LANDA0010, 2LANDA0006
Each container characterized and intended for disposal at WIPP must contain TRU waste.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Containers assayed for WIPP are TRU waste, i.e., they contain >100 nCi/g of transuranic alpha activity.	Y	HENC #2 BDRs 2LANDA0002, 2LANDA0005, 2LANDA0010, 2LANDA0006
NDA instruments and procedures are appropriate for the waste streams being assayed.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The LANL HENC #2 and supporting procedures are appropriate for the wastes currently being assayed.	Y	HENC #2 BDRs 2LANDA0002, 2LANDA0005, 2LANDA0010, 2LANDA0006
NDA instruments and procedures result in unbiased values for the cumulative activity of the WIPP radionuclide inventory.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The radionuclide values produced by the LANL HENC #2 are appropriate for supporting the cumulative activity of the WIPP radionuclide inventory.	Y	HENC #2 BDRs 2LANDA0002, 2LANDA0005, 2LANDA0010, 2LANDA0006
Some radionuclides are derived by the application of scaling factors or correlation techniques. Identify all radionuclides that are quantified in this manner.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	^{234}U, ^{242}Pu and ^{90}Sr are derived by the application of scaling and/or correlation factors.	Y	CCP-TP-103, Revision 6, Appendix 1, pages 15 - 24
Assess the technical adequacy of the calculations involving the application of scaling factors and/or correlation techniques.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The scaling and/or correlation factors cited in the preceding checklist item are technically adequate and appropriately documented.	Y	CCP-TP-103, Revision 6, Appendix 1, pages 15 - 24
Identify the procedures that govern this function and where the results of these calculations are documented.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The procedure that governs the application of scaling factors is identified and the results of these calculations are documented.	Y	CCP-TP-103, Revision 6, Appendix 1, pgs. 15 – 24; HENC #2 BDRs 2LANDA0002, 2LANDA0005, 2LANDA0010, 2LANDA0006

ATTACHMENT A.3: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #2 (LANL HENC #2)

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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Isotopic ratios used in quantifying radionuclides are qualified by confirmatory testing when AK is used	Y	CCP-TP-103, Revision 6, Appendix 1, pages 15 – 24
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	NDA personnel using AK derived isotopic values to calculate radionuclide values do so according to a formal procedure the technical adequacy of which is adequate.	Y	CCP-TP-103, Revision 6, Appendix 1, pages 15 – 24
Identify the procedure and where the results of these calculations are documented.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The procedure for AK calculations is identified and results of these calculations are documented in the LANL HENC #2 BDRs.	Y	CCP-TP-103, Revision 6, Appendix 1, pages 15 – 24; HENC #2 BDRs 2LANDA0002, 2LANDA0005, 2LANDA0010, 2LANDA0006
ISOTOPIC DETERMINATION					
Identify the radionuclides that are measured directly and the specific radiation type (γ, AN or PN) that is measured.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	$^{240}Pu_{EFF}$ is directly measured based on passive neutron emission. Other radionuclides (^{238}Pu, ^{239}, Pu^{242}, Am^{241}, etc.) are derived from $^{240}Pu_{EFF}$ based on isotopics determined by gamma-based MGA or by a direct gamma determination, as appropriate.	Y	*Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0
Identify the method(s) used to derive the isotopic contribution for the unmeasured radionuclides, e.g., MGA, PC FRAM or other technique.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	MGA is used to derive the isotopic contribution for unmeasured radionuclides. All containers (100%) are subject to routine gamma assay although useable data may not be available for each container. AK-based isotopic values are used in the absence of useable MGA values when data to support AK are documented in AK/NDA Memoranda.	Y	CCP-AK-LANL-009 AK/NDA Memorandum, Revision 0; *Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0; Memorandum from W. Estill re: *Evaluation of the Radiological Characterization of LA-MIN03-NC Waste Stream*

ATTACHMENT A.3: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #2 (LANL HENC #2)

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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The LLD for the LANL HENC#1 has been determined for the passive neutron and gamma mode.	Y	MCS-HENC#1-NDA-1002, Revision 0, Tables 8a, 8b, 8c and 8d
Site-specific environmental backgrounds and container-specific interferences must be accounted for in LLD determinations.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Site-specific environmental backgrounds and container specific interferences are accounted for in LLD determinations.	Y	MCS-HENC#1-NDA-1002, Revision 0
NDA instruments performing TRU/Non-TRU waste discrimination measurements are required to have a LLD no greater than 100 nCi/g.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Both the passive neutron and gamma modes have LLDs less than 100 nCi/g for debris and solid matrices	Y	MCS-HENC#1-NDA-1002, Revision 0, Tables 8a, 8b, 8c and 8d
The technical basis and derivation for LLDs must be adequate and appropriately documented.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The technical bases and derivation for the passive neutron and gamma modes are technically adequate and appropriately documented.	Y	*Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	A reporting threshold (LLD analog) has been determined for ^{90}Sr, ^{234}U and ^{242}Pu. These are technically adequate and appropriately documented.	Y	*Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0
Identify any/all instances where an LLD value for a *non-measured* radionuclide is not provided basis on a lack of technical feasibility.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	There are no instances where a LLD value for a *non-measured* radionuclide is not provided basis on a lack of technical feasibility are documented.	NA	Not Applicable

ATTACHMENT A.3: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #2 (LANL HENC #2)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The LLD values listed in MCS-HENC#2-NDA-1002, Revision 0, Tables 8a, 8b, 8c and 8d are typical values that demonstrate the LANL HENC #2's sensitivity with the understanding that these values listed may not be obtained for every assay event.	Y	*Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0
TOTAL MEASUREMENT UNCERTAINTY (TMU)					
The method used to calculate the TMU for all required quantities must be documented and technically justified.		CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The method used to calculate the TMU for the LANL HENC #2 is documented and technically justified.	Y	LANL-HENC2-TMU-101, *Total Measurement Uncertainty for the HENC #2 with Integral Gamma Spectrometer*, Revision 0, April 10, 2006
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The LANL HENC #2 TMU addresses all required elements.	Y	LANL-HENC2-TMU-101, *Total Measurement Uncertainty for the HENC #2 with Integral Gamma Spectrometer*, Revision 0, April 10, 2006

ATTACHMENT A.3: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #2 (LANL HENC #2)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
Methods to determine TMU must be documented, reviewed and approved by CBFO for each NDA instrument.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	CBFO Technical Specialist D. Stuenkel confirmed that the TMU report had been reviewed and approved.	Y	Oral communication with D. Stuenkel and issuance of controlled copy of TMU report.

ATTACHMENT A.3: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #2 (LANL HENC #2)

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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The LANL HENC #2 was originally for both gamma and passive neutron in February 2006. The passive neutron and gamma calibrations are technically adequate.	Y	*Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The operating range is the system LLD to 16.29 g $^{240}Pu_{EFF}$ for passive neutron; LLD to 217 g Pu total for gamma, but gamma range is best expressed as ~50 to 1228 keV, limited by dead time. Matrix density range for gamma is 0.018 to 1.64 g/cc and is suitable to S3000 and S5000 wastes.	Y	*Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Matrix/source waste combinations are representative of routine samples currently measured by the LANL HENC #2. The system is calibrated to 100% recovery.	Y	*Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Consensus standards have been used for calibrating the LANL HENC #2, see checklist item below.	Y	*Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0
Identify the specific consensus standards that were used for the system calibration or, in	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,*	The specific consensus standards used for calibration are: ASTM-C1030-95, ASTM C-	Y	*Calibration Report for HENC #2 Including Passive Neutron and*

ATTACHMENT A.3: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #2 (LANL HENC #2)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
their absence, the alternate calibration technique. Evaluate the CBFO approval of the alternate technique.		Revision 11	1133-96, ASTM C-1207 and ASTM C-1500.		*Gamma Spectrometer Calibration and Confirmation*, Revision 0
Primary standards must be obtained from suppliers maintaining a nationally accredited measurement program. Identify the nationally accredited measurement program.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Primary gamma standards have been obtained a commercial supplier; Pu sources for passive neutron calibration were obtained from R. Marshall's group in the LANL CMR. Both organizations maintain a nationally accredited measurement program.	Y	*Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0
List the standards used for calibration and verify the pedigree of each standard.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The gamma and neutron calibration standards are listed and the pedigree of each has been verified.	Y	*Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, 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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The LANL HENC #2 has not been recalibrated since the system's initial calibration in at LANL in 2006.	Y	*Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0
Recalibration of the system must occur if the calibration verification demonstrates that the system's response has significantly changed.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The system has not been recalibrated. There have been 7 calibration verifications for performance-related reasons between 6-21-06 and 3-5-07, see Section 8.2, LANL HENC#2, (5)	Y	*Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0

ATTACHMENT A.3: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #2 (LANL HENC #2)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
The system calibration must be confirmed by performing replicate measurements of a non-interfering matrix.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The LANL HENC #2's calibration has been confirmed and documented appropriately following each calibration.		*Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0
Replicate measurements must be performed with containers of the same nominal size and according to the same procedures used for actual waste assays.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Replicate measurements have been performed with 55-gallon (208 liter) drums and the operating and data review procedures that are used for routine waste assays.	Y	*Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0; CCP-TP-064; CCP-TP-063; CCP-TP-103
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Replicate measurements have been 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. All standards that were used have been identified and their application documented.	Y	*Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0
Identify the nationally accredited measurement program. List the standards used for verification/confirmation and verify the pedigree of each standard.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Standards are listed in the calibration report. The LANL program's standards are derived from nationally recognized NIST standards	Y	*Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0
The standards used for calibration confirmation must not be the same sources as those used for the system's calibration of		CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The standards used for calibration confirmation are different from those used for the system's calibration of record.	Y	*Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer*

ATTACHMENT A.3: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #2 (LANL HENC #2)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
record.		Revision 11	for the system's calibration of record.		*Calibration and Confirmation*, Revision 0
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.		CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Requirements for accuracy and precision have been met as specified in DOE/WIPP-02-3122, Appendix A, Table A-3.2 for precision and ±30% for accuracy.	Y	*Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0

ATTACHMENT A.3: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #2 (LANL HENC #2)

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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	All radioassay functions and data validation have been performed by appropriately trained and qualified personnel.	Y	CCP-LANL List of Qualified Individuals, 5/22/2006, 10:30 AM provided during inspection
Identify the name, title and function of all personnel performing NDA data validation.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The name, title and function of all NDA personnel performing data validation for the LANL HENC#1 are documented.	Y	CCP-LANL List of Qualified Individuals, 5/22/2006, 10:30 AM provided during inspection
Requalification of personnel must be based on evidence of continued satisfactory performance and must be performed at least every two years.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Requalification of personnel be based on evidence of continued satisfactory performance has been performed at least every two years.	Y	CCP-LANL List of Qualified Individuals, 5/22/2006, 10:30 AM provided during inspection
The site must participate in relevant measurement comparison programs sponsored or approved by CBFO, including the NDA PDP.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The site has participated successfully in Cycle 13A of the CBFO sponsored NDA PDP. The conditional approval of the LANL HENC #2 effective in July 2006 was made permanent upon successful implementation of the LANL Corrective Action Plan that addressed the Cycle 13A PDP failures for the glass matrix container with HS Pu.	Y	July 19, 2006 Memorandum from M. Brown to C. Fesmire *Scoring Results – Primary Cycle 13A Nondestructive Assay PDP;* January 19, 2007 Memorandum from M. Brown to C. Fesmire updating status based on results of NDA PDP Primary Cycle 13A
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	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Daily background are taken and recorded. Contributions to backgrounds from high activity containers that are stored or staged in proximity to the LANL HENC #2 Trailer do affect the background but NDA	Y	*Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0: HENC #2 BDRs

ATTACHMENT A.3: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #2 (LANL HENC #2)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
applicable. Contributions to backgrounds from nearby radiation sources must be carefully controlled, or more frequent backgrounds must be measured.			personnel control this.		2LANDA0002, 2LANDA0005, 2LANDA0010, 2LANDA0006
Assess how often background radiation was problematic to the extent that measurement personnel had to make adjustments.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Background control charts are used to document the system's performance over time.	Y	*Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0; HENC #2 BDRs 2LANDA0002, 2LANDA0005, 2LANDA0010, 2LANDA0006
Identify the criteria used to evaluate instrument backgrounds and assess the technical adequacy of this criterion, i.e., statistical or administrative.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Backgrounds are evaluated against predetermined upper and lower boundaries and are non-statistical in nature. Initial control limits are based on the system's first month of operations and each day's measurements are automatically compared to the established limits	Y	*Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0; HENC #2 BDRs 2LANDA0002, 2LANDA0005, 2LANDA0010, 2LANDA0006
Identify the number of data points required to derive the initial control limit. At what interval(s) will new limits be calculated?	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Initial control limits for all performance measurements were based on six measurements. Limits will be recalculated as more data are acquired or the system is recalibrated.	Y	*Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0; HENC #2 BDRs 2LANDA0002, 2LANDA0005, 2LANDA0010, 2LANDA0006
System performance checks must be performed at least once per operational day.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Performance checks have been performed at least once per operational day and all checks have been documented.	Y	HENC #2 BDRs 2LANDA0002, 2LANDA0005, 2LANDA0010, 2LANDA0006

ATTACHMENT A.3: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #2 (LANL HENC #2)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
System performance checks must include, as applicable, efficiency, matrix correction checks, and systems peak position and resolution for spectrometric systems.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Performance checks include: 121 keV peak centroid and FWHM, 964 peak centroid and FWHM and weighed average of ^{152}Eu activity.	Y	*Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0; HENC #2 BDRs 2LANDA0002, 2LANDA0005, 2LANDA0010, 2LANDA0006
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Two matrix drums are available, a debris and homogeneous solid. They are used with a variety of PDP-type Pu sources that span a range of activity. The acceptance criteria for the Weekly Interfering Matrix checks were not apparent during this inspection.	Y	*Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0; HENC #2 BDRs 2LANDA0002, 2LANDA0005, 2LANDA0010, 2LANDA0006
Interfering surrogate waste matrices must be constructed in a way that the salient matrix characteristics do not change over time.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Interfering surrogate waste matrices have been constructed such that the salient matrix characteristics do not change over time.	Y	Visual examination of matrix drums, interviews with LANL-CCP NDA personnel and evaluation of PDP submittals
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The ^{241}Am, ^{152}Eu and Pu sources used for performance checks are of sufficient activity to provide statistically sufficient results over a short measurement time.	Y	Interviews with LANL-CCP NDA personnel and evaluation of LANL HENC #2 performance data and LANL HENC #2BDRs.
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The ^{241}Am and ^{152}Eu sources are decay corrected as a function of their physical half life. Decay correction is not applicable to ^{239}Pu sources.	Y	Interviews with LANL-CCP NDA personnel and evaluation of LANL HENC #2 performance data and BDRs.

ATTACHMENT A.3: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #2 (LANL HENC #2)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
Performance checks must be quantitative and based on 2 and 3 sigma limits.		CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Limits are based on *Student t-test* for 95% (warning limit) and 99% (control limit) confidence intervals.	Y	CCP-TP-103; *Calibration Report for HENC #2 Including Passive Neutron and Gamma Spectrometer Calibration and Confirmation*, Revision 0; HENC #2 BDRs 2LANDA0002, 2LANDA0005, 2LANDA0010, 2LANDA0006

ATTACHMENT A.3: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #2 (LANL HENC #2)

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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Individual Radioassay Data Sheets (RDS) were reviewed, as indicated. All were acceptable.	Y	HENC #2 BDRs 2LANDA0002, 2LANDA0005, 2LANDA0010, 2LANDA0006
Identify the name, title and function of the individual(s) performing technical review and approval of NDA BRDs.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The name, title and function of the individual(s) performing technical review and approval of NDA BRDs are documented.	Y	HENC #2 BDRs 2LANDA0002, 2LANDA0005, 2LANDA0010, 2LANDA0006
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The LANL HENC #2 BRDs reviewed during this inspection contained all required elements.	Y	HENC #2 BDRs 2LANDA0002, 2LANDA0005, 2LANDA0010, 2LANDA0006

ATTACHMENT A.3: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: LANL High Efficiency Neutron Counter #2 (LANL HENC #2)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
Radioassay data sheets must include: • Title "Radioassay Data 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	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The LANL HENC #2 RDSs evaluated during this inspection included all required elements.	Y	Reviewed RDSs as follows: HENC #2 BDR — Container No. 2LANDA0002 — 53673 2LANDA0005 — S802565 2LANDA0010 — S825813 2LANDA0006 — 57221
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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Nonpermanent records are maintained in the LANL HENC #2 trailer in TA-54, Area G, and all raw data are included on two compact discs that are submitted with each BDR to the CCP office.	Y	Interviews with LANL HENC #2 operator and other LANL-CCP NDA personnel.

ATTACHMENT A.4: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: Portable Tomographic Gamma Scanner (PTGS)

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	NA	The system is the LANL P-TGS (LANL Property No. 959314) and is housed in Trailer No. TA-54-B438 in Technical Area 54 (TA-54), Area G, Pad 10.	Y	Visual observation of the PTGS system in place at Area G of TA-54 at LANL.
Describe the system's operational history including deployment at other DOE sites.	NA	NA	This is the same PTGS unit that was evaluated by EPA previously during EPA-LANL-CCP-04.08.8 in August 2004 and EPA-LANL-CCP-04.05-8 in April 2005. It is used in conjunction with two (2) PC-FRAM Units No. 1 (Detector No. 137P40796A and No.3 (Detector No. 40P21213B). The FRAM units are housed in Trailer No.TA-54-B439 in TA-54, Area G.	Y	Visual observation of the PTGS and FRAM systems in place at Area G of TA-54 at LANL.
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	NA	The system has been refurbished since its initial deployment, including software upgrades (Master Analysis, Master Scan and Maestro), repair of the DSPEC+ spectrometer and modifications to secure the ^{109}Cd rate-loss correction source to the detector face. These have been appropriately documented.	Y	EPA Waste Characterization Reports: EPA Inspection Nos. EPA-LANL-CCP-4.04-08, August 2004; EPA-LANL-CCP-05.05.8, May 2005
SYSTEM PERFORMANCE					
Identify the period of performance relevant to this inspection and if this NDA system has prior EPA approval(s).	NA	NA	The period of performance relevant to this inspection is April 15, 2005 to March 31, 2006, and March 31, 2006 to March 6, 2007	Y	EPA Inspection Letters to D. Moody: April 6, 2006 outlining scope of EPA-LANL-CCP-05.06-8; February 8, 2007, outlining scope of follow-up inspection at LANL-CCP
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 and how many have been promoted through Project Level Review.	NA	NA	During the time period of interest, 951 55-gallon drums have been assayed, and these results have been compiled in a total of 136 BDRs.	Y	*Summary of Waste Drums Measurements on the LANL PTGS/FRAM Systems from April 15, 2005 thru March 31, 2006,* May 25, 2006 provided by Joe Wachter during inspection.

ATTACHMENT A.4: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: Portable Tomographic Gamma Scanner (PTGS)

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	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	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	Radioassay Data Sheets in BDR Nos. LA05-PTGS-092, LA05-PTGS-027, LA05-PTGS-042, LA05-PTGS-057
Each container characterized and intended for disposal at WIPP must contain TRU waste.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Only payload containers that contain TRU radionuclides concentrations greater than 100 nCi/g are eligible for disposal at WIPP.	Y	BDR Nos. LA05-PTGS-092, LA05-PTGS-027, LA05-PTGS-042, LA05-PTGS-057
NDA instruments and procedures are appropriate for the waste streams being assayed.	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan,* Revision 11	PTGS and associated FRAM procedure are appropriate for S5000 debris waste. In this checklist, the term *PTGS* refers to the combination of the PTGS for quantitative ^{239}Pu determination in conjunction with an isotopic distribution from one of the two FRAM units.	Y	Calibration Reports: *Portable TGS Mass Calibration and Calibration Confirmation for Pu-239*, NWIS-TP: 2005-0105, March 31, 2005; *Portable TGS Mass Calibration and Calibration Confirmation for Pu-239*, NWIS-TP:05-0141, August 1, 2005
NDA instruments and procedures result in unbiased values for the cumulative activity of the WIPP radionuclide inventory.	Y	CCP-PO-001 *CCP Transuranic Waste Certification Plan,* Revision 11	The radionuclide values produced by the PTGS are appropriate for supporting the cumulative activity of the WIPP radionuclide inventory.	Y	*Portable TGS Mass Calibration and Calibration Confirmation for Pu-239*, NWIS-TP: 2005-0105, March 31, 2005
Some radionuclides are derived by the application of scaling factors or correlation techniques. Identify all radionuclides that are quantified in this manner.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	All measurements are scaled to the measured ^{239}Pu value, using FRAM or AK-based isotopic values. ^{234}U is scaled to measured values of ^{235}U and ^{238}Pu; ^{242}Pu and ^{90}Sr is scaled to the measured value of ^{137}Cs; and ^{242}Pu is correlated to ^{239}Pu, ^{240}Pu and ^{241}Pu.	Y	LANL Reports: *^{234}U and ^{90}Sr Calculations for NDA Reporting*, LANL, TWCP-12684, April 7, 2003; *CCP-TP-124 Determining Isotopic Ratios in Waste Containers Using the PC/FRAM Assay System*, May 17, 2004

ATTACHMENT A.4: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: Portable Tomographic Gamma Scanner (PTGS)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
Assess the technical adequacy of the calculations involving the application of scaling factors and/or correlation techniques.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan*, Revision 11	The calculations used to apply scaling factors to determine ^{235}U, ^{242}Pu and ^{90}Sr are technically adequate and appropriately documented.	Y	CCP Technical Procedures: CCP-TP-124, Revision 2; CCP-TP-125, Revision 2, Appendix A
Identify the procedures that govern this function and where the results of these calculations are documented.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The procedures controlling the application of scaling factors to determine ^{235}U, ^{242}Pu and ^{90}Sr are identified. The results are documented in Radioassay BDRs.	Y	CCP-TP-124, Revision 2; CCP-TP-125, Revision 2, Appendix A; Radioassay BDR Nos. LA05-PTGS-092, LA05-PTGS-027, LA05-PTGS-042, LA05-PTGS-057
ACCEPTABLE KNOWLEDGE (AK)					
If isotopic ratios based on AK are used the values are qualified by confirmatory testing.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	Isotopic ratios are determined using sample-specific gamma data and PC-FRAM. AK indicates that debris waste is primarily WG Pu. If default isotopic ratios are unavailable only radionuclides that are directly measured will be reported.	Y	CCP Technical Procedures: CCP-TP-124, Revision 2; CCP-TP-125, Revision 2
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	CCP-PO-001 *CCP Transuranic Waste Certification Plan,* Revision 11	AK derived isotopic values are documented in CCP-AK/NDA Memoranda. This activity is technically adequate and is executed in accordance with CCP procedures.	Y	CCP-AK-LANL-009 AK/NDA Memorandum, Revision 0; Memoranda from S. Schafer and W. Estill regarding Waste Stream LA-MIN03-NC; CCP-TP-124, Revision 2; CCP-TP-125, Revision 2
Identify the procedure and where the results of these calculations are documented.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	The results of these calculations are documented in PTGS BDRs.	Y	BDR Nos. LA05-PTGS-092, LA05-PTGS-027, LA05-PTGS-042, LA05-PTGS-057
ISOTOPIC DETERMINATION					

ATTACHMENT A.4: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: Portable Tomographic Gamma Scanner (PTGS)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
Identify the radionuclides that are measured directly and the specific radiation type (gamma, AN or PN) that is measured.	Y	CCP-PO-001, *CCP ransuranic Waste Certification Plan,* Revision 11	The PTGS measures the gamma emission of the 414 keV line of ^{239}Pu. All other radionuclides that are reported are based on this measurement.	Y	CCP-TP-126, Revision X; CCP-TP-123, Revision 2
Identify the method(s) used to derive the isotopic contribution for the unmeasured radionuclides, e.g., MGA, PC FRAM or other technique.	Y	CCP-PO-001,*CCP Transuranic Waste Certification Plan,* Revision 11	FRAM is used for the isotopic determination. AK isotopics (default) are used when required.	Y	CCP Technical Procedures: CCP-TP-124, Revision 2; CCP-TP-125, Revision 2

ATTACHMENT A.4: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: Portable Tomographic Gamma Scanner (PTGS)

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	CCP-PO-001,*CCP Transuranic Waste Certification Plan* Revision 11	The LLD for the PTGS has been determined and is technically adequate and appropriately documented.	Y	*Lower Limit of Detection for the LANL Portable Tomographic Gamma Scanner (PTGS*), NWIS-TP:05-0094, 03/15/05
Site-specific environmental backgrounds and container-specific interferences must be accounted for in LLD determinations.	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	LLD determinations are container-specific. TA-54 Area G backgrounds are addressed in all LLD determinations	Y	*Lower Limit of Detection for the LANL Portable Tomographic Gamma Scanner (PTGS*), NWIS-TP:05-0094, 03/15/05
NDA instruments performing TRU/Non-TRU waste discrimination measurements are required to have a LLD no greater than 100 nCi/g.	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan,* Revision 11	The PTGS is not used to distinguish TRU and Non-TRU wastes. The LLD is approximately 0.09 g ^{239}Pu, which is well below the system's operational range of 0.565 – 176.76 g of ^{239}Pu	Y	*Lower Limit of Detection for the LANL Portable Tomographic Gamma Scanner (PTGS*), NWIS-TP:05-0094, 03/15/05
The technical basis and derivation for LLDs must be adequate and appropriately documented.	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan,* Revision 11	Only assay values above the LLD and system's operational range of 0.565 – 176.76 g of ^{239}Pu will be reported. Assays that are below the system's LLD are flagged as *failed assays*, in accordance with CCP-TP-125, and an NCR is initiated for each.	Y	*Lower Limit of Detection for the LANL Portable Tomographic Gamma Scanner (PTGS*), NWIS-TP:05-0094, 03/15/05
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	CCP-PO-001, *CCP Transuranic Waste Certification Plan,* Revision 11	LLDs for all radionuclides except ^{239}Pu are determined relative to the ^{239}Pu LLD, and all could be considered a technically based reporting threshold.	Y	*Lower Limit of Detection for the LANL Portable Tomographic Gamma Scanner (PTGS*), NWIS-TP:05-0094, 03/15/05

ATTACHMENT A.4: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: Portable Tomographic Gamma Scanner (PTGS)

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 basis on a lack of technical feasibility.	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	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	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	LLDs are measurement-event specific, based on the system's response to the 414 keV ^{239}Pu line.	Y	*Lower Limit of Detection for the LANL Portable Tomographic Gamma Scanner (PTGS*), NWIS-TP:05-0094, 03/15/05
TOTAL MEASUREMENT UNCERTAINTY (TMU)					
The method used to calculate the TMU for all required quantities must be documented and technically justified.	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	The TMU determination for the PTGS is documented and technically adequate.	Y	*Revision to TWCP-23398, Total Measurement Uncertainty (TMU) Report for the Portable Tomographic Gamma Scanner (PTGS)*, NWIS-TP:2005-0102, 03/30/05.
TMU determination accounts for all sources of uncertainty, as appropriate, specifically: • Random errors • Calibration • Isotopic determination • Matrix inhomogeneity • Difference between calibration assumptions and actual waste	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	The TMU determination accounts for all sources of uncertainty applicable to the PTGS.	Y	

ATTACHMENT A.4: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: Portable Tomographic Gamma Scanner (PTGS)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
• Non uniform source distribution • End effects • 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	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	CBFO Technical Specialist D. Stuenkel confirmed that the TMU report had been reviewed and approved	Y	

ATTACHMENT A.4: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006

NDA System: Portable Tomographic Gamma Scanner (PTGS)

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	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	The PTGS was initially calibrated in December 2003. It was recalibrated in December 2004, and again in August 2005. All calibrations are appropriately documented	Y	Calibration Reports*: Portable TGS Mass Calibration and Calibration for Pu-239*, RRES-CH:04-005, January 7, 2004; *Portable TGS Mass Calibration and Calibration Confirmation for Pu-239*, NWIS-TP: 2005-0105, March 31, 2005; *Portable TGS Mass Calibration and Calibration Confirmation for Pu-239*, NWIS-TP:05-0141, August 1, 2005
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	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	The calibration range of the PTGS is from of 0.565 – 176.76 g of ^{239}Pu. The PTGS assays only debris (S5000) wastes. The PTGS is prohibited from assaying HS Pu in any matrix due to a NDA PDP failure of Cycle 13A.	Y	*Portable TGS Mass Calibration and Calibration Confirmation for Pu-239*, NWIS-TP:05-0141, August 1, 2005; January 19, 2007 Memorandum from M. Brown to C. Fesmire updating status based on results of NDA PDP Primary Cycle 13A
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	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	The calibration was performed in a 55-gallon (208 liter) drum using a combustibles matrix similar to the routine waste matrix. The PTGS is calibrated to 100% recovery.	Y	*Portable TGS Mass Calibration and Calibration Confirmation for Pu-239*, NWIS-TP:05-0141, August 1, 2005

ATTACHMENT A.4: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006

NDA System: Portable Tomographic Gamma Scanner (PTGS)

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	CCP-PO-001, *CCP Transuranic Waste Certification Plan,* Revision 11	Consensus standard for calibration have not been identified. CBFO has approved *Recalibration and Confirmation Plan for the Portable Tomographic Gamma Scanner – June 2005.*	Y	CCP-TP-123, Revision 2; *Recalibration and Confirmation Plan for the Portable Tomographic Gamma Scanner – June 2005.*
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	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	See previous checklist item.	Y	See previous checklist item.
Primary standards must be obtained from suppliers maintaining a nationally accredited measurement program. Identify the nationally accredited measurement program.	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan,* Revision 11	Certificates for the PuO_2 sources used for calibration were reviewed and found to be acceptable. All are PDP-style sources traceable to NIST.	Y	LANL *Certificate of Content and Traceability* signed by R. Marshall for sources: 2.8, 25.0, 93.0, 139.5 and 164.5 g of ^{239}Pu
List the standards used for calibration and verify the pedigree of each standard.	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	Standards used for calibration included combinations of PuO_2 sources totaling 0, 0.6, 3, 10, 100, and 189 g total Pu and were obtained by combining the specific ^{239}Pu sources listed to the right. Each source has an acceptable pedigree.	Y	LANL *Certificate of Content and Traceability* signed by R. Marshall for ^{239}Pu sources PDP1-0.1, PDP1-0.5, PDP1-3.0, PDP1-10, TANT25-1, RANT50-1, RANT50-2 and RANT50-3
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	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	Initial verification of the PTGS calibration was performed and documented. Two subsequent verifications were performed, on	Y	Calibration Verification Reports: *Calibration Verification of the Portable Tomographic Gamma Scanner*, NWIS-TA-54EAST:05-

ATTACHMENT A.4: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006
NDA System: Portable Tomographic Gamma Scanner (PTGS)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
of the system's components, significant changes to the system's software, and relocation of the system.			August 1-2, 2005 and October 3-4, 2005. These were required due to replacement of the system's spectrometer and a shutter problem, respectively. Both verifications were performed and documented appropriately.		0148, August 16, 2005; *Calibration Verification of the Portable Tomographic Gamma Scanner*, NWIS-TA-54EAST:06-005, November 7, 2005
Recalibration of the system must occur if the calibration verification demonstrates that the system's response has significantly changed.	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	The PTGS was recalibrated in August 2005, see previous checklist entry.	Y	*Portable TGS Mass Calibration and Calibration Confirmation for Pu-239*, NWIS-TP:05-0141, August 1, 2005.
The system calibration must be confirmed by performing replicate measurements of a non-interfering matrix.	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	Calibration confirmation has been performed by making six (6) replicate measurements for each of three (3) drums containing 0.9, 9, and 160 g total Pu in a non-interfering matrix, as documented in NWIS-TP: 2005-0105.	Y	*Portable TGS Mass Calibration and Calibration Confirmation for Pu-239*, NWIS-TP:05-0141, August 1, 2005
Replicate measurements must be performed with containers of the same nominal size and according to the same procedures used for actual waste assays.	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	Replicate measurements have been performed with containers of the same nominal size and according to the same procedures as those used for actual waste assays. Replicate measurements were made using 55-gallon drums of the same size and shape as those to be assayed.	Y	Replicate measurements were made in accordance with CCP-TP-126, *Waste Assay Using the Portable Tomographic Gamma Scanner*, Revision 3, the same procedure used for routine assays.
Replicate measurements must be performed using nationally recognized	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan*	Replicate measurements have been performed using PuO_2 sources of the	Y	*Portable TGS Mass Calibration and Calibration Confirmation for*

ATTACHMENT A.4: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
Inspection Date: May 23 – 25, 2006

NDA System: Portable Tomographic Gamma Scanner (PTGS)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
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).		Revision 11	same type as those discussed above for calibration. Sources span the range of use of the PTGS with respect to activity and matrix. All standards have been identified and are listed in the column to the right.		*Pu-239*, NWIS-TP:05-0141, August 1, 2005; ^{239}Pu sources NTP-0085, NTP-0092, NTP-0099, NTP-0120, NTP-0106, NTP-0113, NTP-0140, NTP-0148, NTP-0156 and NTP-0164
Identify the nationally accredited measurement program. List the standards used for verification/confirmation and verify the pedigree of each standard.	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	The LANL program that fabricated the PuO_2 sources is a nationally accredited measurement program. All PuO_2 sources used for verification and/or confirmation are traceable to NIST.	Y	Sources for verification and/or confirmation are listed in the cell above. The pedigrees of all sources have been verified.
The standards used for calibration confirmation must not be the same sources as those used for the system's calibration of record.	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	The standards used for calibration confirmation are different from the sources used for the system's calibration of record.	Y	*Portable TGS Mass Calibration and Calibration Confirmation for Pu-239*, NWIS-TP:05-0141, August 1, 2005
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	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	Requirements for accuracy and precision have been met as specified in DOE/WIPP-02-3122, Appendix A, Table A-3.2 for precision and ±30% for accuracy.	Y	Performance goals for accuracy (70% < %R < 130%) and precision (%RSD < 14%) have been met for each of the three mass loadings.

ATTACHMENT A.4: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
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NDA System: Portable Tomographic Gamma Scanner (PTGS)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
QUALITY CONTROL					
All radioassay data validation must be performed by appropriately trained and qualified personnel.	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	All radioassay data validation and review personnel have been trained and are currently listed as qualified personnel.	Y	CCP-LANL List of Qualified Individuals, 5/22/2006, 10:30 AM (NDA PTGS/FRAM) provided during inspection
Identify the name, title and function of all personnel performing NDA data validation.	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	Expert Analysts: Doug Cramer, Harald Poths, and Joseph Wachter Independent Technical Reviewers	Y	CCP-LANL List of Qualified Individuals, 5/22/2006, 10:30 AM (NDA PTGS/FRAM) provided during inspection
Requalification of personnel must be based on evidence of continued satisfactory performance and must be performed at least every two years.	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	Requalification of personnel be based on evidence of continued satisfactory performance has been performed at least every two years.	Y	CCP-LANL List of Qualified Individuals, 5/22/2006, 10:30 AM (NDA PTGS/FRAM) provided during inspection
All computer programs, including spreadsheets used for data reduction or analysis, must meet the applicable requirements in the CBFO QAPD.	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	All computer programs, including spreadsheets used for data reduction or analysis, meet the applicable requirements in the CBFO QAPD.	Y	Software includes Master Analysis V4.1.2, Master Scan V3.1.6 and Maestro V6.03.
The site must participate in relevant measurement comparison programs sponsored or approved by CBFO, including the NDA PDP.	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	The site has participated successfully in the CBFO sponsored NDA PDP Primary Cycle 13A. PTGS is prohibited from assaying HS Pu	Y	July 19, 2006 Memorandum from M. Brown to C. Fesmire *Scoring Results – Primary Cycle 13A Nondestructive Assay PDP;* January 19, 2007 Memorandum from M. Brown to C. Fesmire updating status based on results of NDA PDP Primary Cycle 13A

ATTACHMENT A.4: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
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NDA System: Portable Tomographic Gamma Scanner (PTGS)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
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	CCP-PO-001, *CCP Transuranic Waste Certification Plan,* Revision 11	The PTGS background is measured daily for each assay event using the 414 keV emission line of ^{239}Pu and backgrounds are recorded in PTGS BDRs. Contributions to backgrounds from nearby radiation sources (high activity staged drums) have the potential to affect PTGS backgrounds and these are controlled.	Y	PTGS BDR Nos. LA05-PTGS-092, LA05-PTGS-027, LA05-PTGS-042, LA05-PTGS-057
Assess how often background radiation was problematic to the extent that measurement personnel had to make adjustments.	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan,* Revision 11	Background records in the PTGS BRDs reviewed for this inspection do not indicate a serious background problem.	Y	PTGS BDR Nos. LA05-PTGS-092, LA05-PTGS-027, LA05-PTGS-042, LA05-PTGS-057
Identify the criteria used to evaluate instrument backgrounds and assess the technical adequacy of this criterion, i.e., statistical or administrative.	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan,* Revision 11	Backgrounds have been evaluated against an acceptance criterion derived by dividing the net counts by the uncertainty.	Y	PTGS BDR Nos. LA05-PTGS-092, LA05-PTGS-027, LA05-PTGS-042, LA05-PTGS-057
Identify the number of data points required to derive the initial control limit and for all subsequent changes to the limits. At what interval(s) will new limits be calculated?	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan,* Revision 11	The number of data points required to derive the initial control limit and the interval(s) at which will new limits be calculated are documented.	Y	*Lower Limit of Detection for the LANL Portable Tomographic Gamma Scanner (PTGS*), NWIS-TP:05-0094, 03/15/05
System performance checks must be performed at least once per operational day.	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan,* Revision 11	Performance checks have been performed at least once per operational day and all checks have been documented.	Y	Reviewed control charts in BDR Nos. LA05-PTGS-092, LA05-PTGS-027, LA05-PTGS-042, LA05-PTGS-057
System performance checks must include, as applicable, efficiency, matrix correction	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan,*	Checks include: Efficiency using TGS# for ^{133}Ba at 356 keV; FWHM for ^{109}Cd	Y	Reviewed control charts in BDR Nos. LA05-PTGS-092, LA05-

ATTACHMENT A.4: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

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NDA System: Portable Tomographic Gamma Scanner (PTGS)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
checks, and systems peak position and resolution for spectrometric systems.		Revision 11	and ^{133}Ba; energy calibration control at 88 and 356 keV using ^{75}Se		PTGS-027, LA05-PTGS-042, LA05-PTGS-057
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	CCP-PO-001, *CCP Transuranic Waste Certification Plan,* Revision 11	Combustibles (debris) matrix is used with PuO_2 sources of 2.8, 25.0, 93.0, 135.5 and 164.5 g total Pu for weekly interfering matrix checks.	Y	Interfering Matrix Reports: *Weekly Interfering Matrix Check Results LANL PTGS and FRAM Systems*, 10/1/2005 – 3/31/2006; NWIS-TA-54EAST: 06-0024, May 1, 2006; and *Weekly Interfering Matrix Check Results for the Los Alamos National Laboratory (LANL) PTGS and Fixed Energy Response Function Analysis (FRAM) Systems PTGS and FRAM Systems*, 10/1/2005 – 3/31/2006; NWIS-TA-54EAST: 06-0014, January 5, 2006
Interfering surrogate waste matrices must be constructed in a way that the salient matrix characteristics do not change over time.	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	Matrix containers are the same as those used for the CBFO sponsored NDA PDP and are adequately constructed.	Y	Visual examination of matrix drums, interviews with LANL-CCP NDA personnel and evaluation of PDP submittals
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	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	^{133}Ba, ^{109}Cd, ^{75}Se and ^{239}Pu sources are of adequate intensity for their intended purposes.	Y	Interviews with LANL-CCP NDA personnel and evaluation of PTGS performance data and PTGS BDRs.
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	CCP-PO-001, *CCP Transuranic Waste Certification Plan,* Revision 11	^{133}Ba, ^{109}Cd and ^{75}Se sources are decay corrected as appropriate. Decay correction is not applicable to ^{239}Pu sources.	Y	Interviews with LANL-CCP NDA personnel and evaluation of PTGS performance data and PTGS BDRs.

ATTACHMENT A.4: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
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NDA System: Portable Tomographic Gamma Scanner (PTGS)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
Performance checks must be quantitative and based on 2 and 3 sigma limits.	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan,* Revision 11	Limits are based on *Student t-test* for 95% (warning limit) and 99% (control limit) confidence intervals.	Y	CCP-TP-125, Revision 2; PTGS BDR Nos. LA05-PTGS-092, LA05-PTGS-027, LA05-PTGS-042, LA05-PTGS-057

ATTACHMENT A.4: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
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NDA System: Portable Tomographic Gamma Scanner (PTGS)

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	CCP-PO-001, *CCP Transuranic Waste Certification Plan,* Revision 11	Individual Radioassay Data Sheets (RDS) were reviewed, as indicated. All were acceptable.	Y	Reviewed RDSs as follows: PTGS BDR Container No. LA05-PTGS-092: 53352, S834686 LA05-PTGS-027: 53973, S855579 LA05-PTGS-042: 60727, S835392 LA05-PTGS-057: S845254, S84153
Identify the name, title and function of the individual(s) performing technical review and approval of NDA BRDs.	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan,* Revision 11	The name, title and function of all personnel performing review and approval of BRDs are documented. All personnel are appropriately qualified.	Y	PTGS BDR Nos. LA05-PTGS-092, LA05-PTGS-027, LA05-PTGS-042, LA05-PTGS-057
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.	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	The PTGS BRDs reviewed during this inspection contained all required elements.	Y	PTGS BDR Nos. LA05-PTGS-092, LA05-PTGS-027, LA05-PTGS-042, LA05-PTGS-057

ATTACHMENT A.4: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8
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NDA System: Portable Tomographic Gamma Scanner (PTGS)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
• Data validation per the QAPD and site procedures • Separate testing report sheets for each container.					
Radioassay data sheets must include: • Title "Radioassay Data 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	Y	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	The PTGS RDSs evaluated during this inspection included all required elements.	Y	Reviewed RDSs as follows: PTGS BDR Container No. LA05-PTGS-092: 53352, S834686 LA05-PTGS-027: 53973, S855579 LA05-PTGS-042: 60727, S835392 LA05-PTGS-057: S845254, S84153
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	CCP-PO-001, *CCP Transuranic Waste Certification Plan*, Revision 11	Nonpermanent records are maintained in the PTGS trailer in TA-54, Area G, and all raw data are included on two compact discs that are submitted with each BDR to the CCP office.	Y	Interviews with PTGS operator and other personnel.

ATTACHMENT A.5: REAL-TIME RADIOGRAPHY (RTR) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8 **Inspection Date:** May 23 – 25, 2006

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 CCP-QP-002, Rev. 20 CCP-TP-028, Rev. 3	• 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) • Training drum contains all required items • RTR operators receive training on the waste matrix parameters and typical packaging configurations expected to be found in each waste stream.	Y	CCP uses Qualification Cards to document and record training received by CCP personnel. The Site Project Manager appoints RTR Subject Matter Experts (SME) and this appointment is documented by a letter included in the SME's training file. The site maintains a List of Qualified Individuals which is used to ensure all training is current. During the inspection, EPA reviewed the latest competency demonstration tape and documentation (required every six months) for an RTR SME. The test was performed on 5/3/06 and drum used was LANL-NDE-TEST-001-CL. There were no problems identified during this review. Training on specific waste generating processes, typical packaging configurations, and WMPs expected to be found in each waste stream is provided to the RTR personnel. However, this training is provided only once unless there is an update to the AK record. Objective evidence reviewed: 1. Competency demonstration audio/visual tape and associated documentation for SME 2. List of Qualified Individuals for RTR 3. RTR demonstration: RTR unit #1, debris drum S852566. RTR unit #2, debris drum 58959.
RTR-2: Site procedure(s) provide complete instructions for operators to perform the RTR examination and completion of the associated documentation	Y CCP-TP-002, Rev. 20 CCP-TP-053, Rev. 4, s. 4.0, Attachments 1 & 2	• RTR operator adequately explained the process followed for examining a drum and entering data into data forms (whether hard copy or electronic data entry is used).	Y	During the on-site inspection, EPA observed the RTR event for a debris (S5000) drum, number S852566, on RTR unit #1. EPA also observed the RTR event for a debris (S5000) drum, number 58959, on RTR unit #2. The operators had a copy of the applicable procedure (CCP-TP-053) available in the RTR operations area and performed the RTR event in accordance with the procedure instructions

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/ Comment
				RTR data are electronically entered into the data form (Attachment 2 of procedure CCP-TP-053) by second person who acts as a data recorder only (they are not qualified RTR operators). Although the Lines Pair Resolution check for each unit was completed prior to EPA's arrival, this quality check formed part of the audio/visual recordings and BDRs reviewed by EPA. EPA reviewed audio/visual recordings and BDRs generated from both RTR units. The tapes were complete but one issue was identified with the generation of the RTR data. Waste Material Parameter weights (WMPs) are inconsistently recorded for leaded rubber gloves during RTR and VE. In RTR the weight of the glove is assigned solely to Rubber but in VE the weight is split 60:40 between Rubber and Other Metal (see also VE checklist). EPA generated the following Concern to address this issue. LANL-CCP-VE-06-006CR: 1. Waste Material Parameter weights are inconsistently recorded for leaded rubber gloves. In RTR, leaded gloves are recorded as only under the rubber waste material parameter but in VE the weight of the gloves is assigned in the following way: 60% rubber and 40% other metals. 2. VE personnel were unable to provide the rationale for assigning the weights (60:40) in this manner. Objective evidence reviewed: 1. Batch Data Report and audio/visual recording for batches LA-RTR2-05-0103 (S5000), LA-RTR2-05-0111 (S3000 and S5000), LA-RTR2-

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/ Comment
				05-0112 (S3000), LA-RTR2-05-0194 (S5000), LA-RTR1-06-0003 (S3000 and S5000), LA-RTR1-06-0002 (S5000), LA-RTR1-06-0001 (S5000) 2. BDRs LA-RTR2-05-0123 (S5000), LA-RTR2-04-0007, LA-RTR2-05-0152 (S3000), LA-RTR2-05-0175 (S3000 and S5000) 3. RTR demonstration: RTR unit #1, debris drum S852566; RTR unit #2, debris drum 58959.
RTR-3: The RTR procedure(s) require an image quality check to be performed	Y CCP-TP-053, Rev. 4, s. 4.3, Attachment 1	• Operator adequately explained how the acceptability of an image is determined • Image quality check is performed once per day • Performance of the image quality check is documented and recorded	Y	EPA observed the RTR examination of a debris drum on both RTR unit #1and #2 (drums S852566 and 58959). The operator varied the voltage used during the examination to accommodate the density of the WMPs present. The operator called out the WMPs present and this information was recorded by a second person (not a qualified RTR operator). At the conclusion of the examination, the operator assigned WMP weights based on the information recorded in Attachment 2 of the procedure. In each of the BDRs reviewed, the image quality check was documented on Attachment 1 of the procedure CCP-TP-053 (RTR Measurement Control Report). EPA also reviewed the image quality check on selected audio/visual recordings of RTR examinations. Objective evidence reviewed: 1. Batch Data Report and audio/visual recording for batches LA-RTR2-05-0103 (S5000), LA-RTR2-05-0111 (S3000 and S5000), LA-RTR2-05-0112 (S3000), LA-RTR2-05-0194 (S5000), LA-RTR1-06-0003 (S3000 and S5000), LA-RTR1-06-0002 (S5000), LA-RTR1-06-0001 (S5000)

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/ Comment
				2. BDRs LA-RTR2-05-0123 (S5000), LA-RTR2-04-0007, LA-RTR2-05-0152 (S3000), LA-RTR2-05-0175 (S3000 and S5000) 3. RTR demonstration: RTR unit #1, debris drum S852566. RTR unit #2, debris drum 58959.
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 CCP-TP-053, Rev. 4, s. 4.3, 4.4	• 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)	Y	EPA observed the RTR examination of a debris drum on both RTR unit #1and #2 (drums S852566 and 58959). The operator varied the voltage used during the examination to accommodate the density of the WMPs present. The operator called out the WMPs present and this information was recorded by a second person (not a qualified RTR operator). At the conclusion of the examination, the operator assigned WMP weights based on the information recorded in Attachment 2 of the procedure. The operator was able to explain when an NCR would be written. Some of the BDRs reviewed contained NCRs for prohibited items. For example, LA-RTR1-06-0003, containers S814989, S815999, and S815002, all had liners that were not adequately vented and NCR-LANL-0787-06 was written to address this issue. Also, LA-RTR2-05-0175, drum S822352, contained liquids greater than 1" and NCR-LANL-0187-05 was written to address this prohibited item. In each of the BDRs reviewed, the image quality check was documented on Attachment 1 of the procedure CCP-TP-053 (RTR Measurement Control Report). EPA also reviewed the image quality check on selected audio/visual recordings of RTR examinations. Objective evidence reviewed: 1. Batch Data Report and audio/visual recording

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/ Comment
				for batches LA-RTR2-05-0103 (S5000), LA-RTR2-05-0111 (S3000 and S5000), LA-RTR2-05-0112 (S3000), LA-RTR2-05-0194 (S5000), LA-RTR1-06-0003 (S3000 and S5000), LA-RTR1-06-0002 (S5000), LA-RTR1-06-0001 (S5000) 2. BDRs LA-RTR2-05-0123 (S5000), LA-RTR2-04-0007, LA-RTR2-05-0152 (S3000), LA-RTR2-05-0175 (S3000 and S5000) 3. RTR demonstration: RTR unit #1, debris drum S852566; RTR unit #2, debris drum 58959
RTR-5:	Y CCP-TP-053, Rev. 4, s. 4.0, Attachment 1	• 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	As part of the inspection, the tapes and BDRs for selected drums in batches LA-RTR2-05-0103 (S5000), LA-RTR2-05-0111 (S3000 and S5000), LA-RTR2-05-0112 (S3000), LA-RTR2-05-0194 (S5000), LA-RTR1-06-0003 (S3000 and S5000), LA-RTR1-06-0002 (S5000), LA-RTR1-06-0001 (S5000) were reviewed. The data recorded on the audio/visual tapes and BDRs for the drums reviewed were consistent. The audio/visual tapes were audible and of good quality. Objective evidence reviewed: 1. Batch Data Report and audio/visual recording for batches LA-RTR2-05-0103 (S5000), LA-RTR2-05-0111 (S3000 and S5000), LA-RTR2-05-0112 (S3000), LA-RTR2-05-0194 (S5000), LA-RTR1-06-0003 (S3000 and S5000), LA-RTR1-06-0002 (S5000), LA-RTR1-06-0001 (S5000)
RTR-6: There is a procedure for determining whether the waste	Y CCP-TP-053, Rev. 4,	• The procedure is adequately implemented • Operators verify that the waste matches the waste stream description	Y	Procedure CCP-TP-053 contains a standard weight table, Table 3, which was available to the operators observed by EPA. However, this table is not used consistently when estimating leaded glove WMPs

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/ Comment
matches the waste stream description and Waste Matrix Code, and for determining Waste Material Parameters and weights	s. 4.4.3 [D]-[F], [H], Attachment 2, Table 3	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?		(see EPA Concern LANL-CCP-VE-06-006CR in RTR-2 above). Attachment 2, CCP-TP-053, Radiography Data Sheet, documents that the physical form of the waste matches the waste stream description and the waste matrix code. During the RTR demonstration observed by EPA, neither of the operators interviewed (RTR units # 1 and 2) were able to explain how they verified that the waste examined matched the waste stream description. The operators did not have a hard copy or electronic version of the waste stream description available in the RTR trailers and they were not able to describe the expected WMPs in the waste stream they were examining (see also the VE checklist). EPA generated the following Concern to address this issue (see also VE-6). LANL-CCP-VE-06-005CR: Attachments used for data entry for both RTR and VE include a line item that requires operators to verify that the waste examined matches the Waste Stream description. The VEE for the VE demonstration and the operators of RTR units 1 and 2, observed by EPA on 5/24/06, could not explain how they were able to answer this question. These personnel did not have a copy of Waste Stream descriptions, for example CCP-LANL-AK-9, in their respective work areas nor were they able to describe the items included in the Waste Stream descriptions provided in the AK Summary Report for the waste stream they were currently examining. Prior to the March 6, 2007 meeting EPA reviewed a copy of the CCP RTR and VE Training Module (PowerPoint presentation) and the NDE RTR Comprehensive Examination. During the March meeting, EPA interviewed RTR operators who were able to

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/ Comment
				correctly answer questions with the regard to the data form items detailed above. The operators also demonstrated that they had access to both paper and electronic copies of the applicable waste stream description. EPA considers this concern to be closed. Objective evidence reviewed: 1. Batch Data Report and audio/visual recording for batches LA-RTR2-05-0103 (S5000), LA-RTR2-05-0111 (S3000 and S5000), LA-RTR2-05-0112 (S3000), LA-RTR2-05-0194 (S5000), LA-RTR1-06-0003 (S3000 and S5000), LA-RTR1-06-0002 (S5000), LA-RTR1-06-0001 (S5000) 2. BDRs LA-RTR2-05-0123 (S5000), LA-RTR2-04-0007, LA-RTR2-05-0152 (S3000), LA-RTR2-05-0175 (S3000 and S5000) 3. RTR demonstration: RTR unit #1, debris drum S852566; RTR unit #2, debris drum 58959. 4. Visual Examination and Real-Time Radiography Training Module 5. LANL – NDE RTR Comprehensive Examination
RTR-7: The RTR procedure provides instructions for identifying prohibited items and for processing drums containing prohibited	Y CCP-TP-053, Rev. 4, s. 4.4.3, Note following [F], [G], Attachment 1, Table 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	The operator demonstrated how the presence of free liquids is determined (rocking the container). Numerous NCRs had been generated in the BDRs reviewed for the presence of liquids (see EPA Finding LANL-CCP-VE-06-004F in the VE checklist) and other prohibited items. For example, NCR-LANL-0786-06 was initiated for drum S833213 because of a sealed container greater than 4 liters and NCR-LANL-0727-06 was initiated for the presence of PCBs. NCR-LANL-0125-05 was initiated for drum S834116 because of greater than 1"

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/ Comment
				of liquid at the 30" mark and greater than 1% volume of liquid in the drum. Prohibited items are listed in the procedure, Table 1. Objective evidence reviewed: 1. Batch Data Report and audio/visual recording for batches LA-RTR2-05-0103 (S5000), LA-RTR2-05-0111 (S3000 and S5000), LA-RTR2-05-0112 (S3000), LA-RTR2-05-0194 (S5000), LA-RTR1-06-0003 (S3000 and S5000), LA-RTR1-06-0002 (S5000), LA-RTR1-06-0001 (S5000) 2. BDRs LA-RTR2-05-0123 (S5000), LA-RTR2-04-0007, LA-RTR2-05-0152 (S3000), LA-RTR2-05-0175 (S3000 and S5000)
RTR-8: RTR procedures include the required QC examinations, evaluation accuracy and reproducibility of the RTR process	Y CCP-TP-053, Rev. 4, s. 4.5, 4.6	• 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	In batch LA-RTR1-06-0002, an independent observation was performed on container 54374 and a replicate scan was performed on container 55434. In batch LANL-RTR2-05-0123, an independent observation was performed on container 59316and a replicate scan was performed on container 57776. Both of the QC samples were performed by a different operator to the original. Objective evidence reviewed: 1. Batch Data Report and audio/visual recording for batchs LA-RTR2-05-0103 (S5000), LA-RTR2-05-0111 (S3000 and S5000), LA-RTR2-05-0112 (S3000), LA-RTR2-05-0194 (S5000), LA-RTR1-06-0003 (S3000 and S5000), LA-RTR1-06-0002 (S5000), LA-RTR1-06-0001 (S5000) 2. BDRs LA-RTR2-05-0123 (S5000), LA-RTR2-04-0007, LA-RTR2-05-0152 (S3000), LA-RTR2-05-0175 (S3000 and S5000)

ATTACHMENT A.5: REAL-TIME RADIOGRAPHY (RTR) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8 **Inspection Date:** May 23 – 25, 2006

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/ Comment
RTR-9: Procedure(s) contain standardized forms for recording RTR data	Y CCP-TP-053, Rev. 4, Attachments 1 & 2	• RTR operator adequately explained the process followed for examining a drum and entering data into data forms (whether hard copy or electronic data entry is used). • Direct data entry 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 inspection, EPA observed the RTR event for a debris (S5000) drum on RTR unit #1 and RTR unit #2. The operators had a copy of the applicable procedure (CCP-TP-053) available in the RTR operations area and performed the RTR event in accordance with the instructions contained in that procedure. RTR data are electronically entered into the data form (Attachment 2 of procedure CCP-TP-053) by an individual whose sole function is to record the RTR data generated (this person is not a qualified RTR operator). The procedure contains a standard weight table (Table 3). BDRs are subject to both data generation and project level reviews. The checklists for the BDRs reviewed were complete, signed and dated. Objective evidence reviewed: 1. Batch Data Report and audio/visual recording for batches LA-RTR2-05-0103 (S5000), LA-RTR2-05-0111 (S3000 and S5000), LA-RTR2-05-0112 (S3000), LA-RTR2-05-0194 (S5000), LA-RTR1-06-0003 (S3000 and S5000), LA-RTR1-06-0002 (S5000), LA-RTR1-06-0001 (S5000) 2. BDRs LA-RTR2-05-0123 (S5000), LA-RTR2-04-0007, LA-RTR2-05-0152 (S3000), LA-RTR2-05-0175 (S3000 and S5000)
RTR-10: Site procedures require review of Batch Data Reports (BDRs) at the data generation and project level	Y CCP-TP-053, Rev. 4, s. 4.10-4.12, Attachments 3-5 CCP-TP-001, Rev. 11	• Data generation level reviews are performed and documented • Project level reviews are performed and documented	Y	All BDRs reviewed during the on-site inspection contained complete and signed data generation level review checklists (Independent Technical Reviewer, Technical Supervisor, and Facility Quality Assurance Officer). The BDRs also contained a complete and signed Site Project Quality Assurance Officer review checklist and a complete and signed SPM Data Validation Summary checklist.

ATTACHMENT A.5: REAL-TIME RADIOGRAPHY (RTR) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8 **Inspection Date:** May 23 – 25, 2006

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/ Comment
				Objective evidence reviewed: 1. Batch Data Report and audio/visual recording for batches LA-RTR2-05-0103 (S5000), LA-RTR2-05-0111 (S3000 and S5000), LA-RTR2-05-0112 (S3000), LA-RTR2-05-0194 (S5000), LA-RTR1-06-0003 (S3000 and S5000), LA-RTR1-06-0002 (S5000), LA-RTR1-06-0001 (S5000) 2. BDRs LA-RTR2-05-0123 (S5000), LA-RTR2-04-0007, LA-RTR2-05-0152 (S3000), LA-RTR2-05-0175 (S3000 and S5000)
RTR-11: Procedures require that RTR operators receive the results of the VE/RTR comparison	Y CCP-TP-053, Rev. 4	• RTR operators receive the results of the VE/RTR comparison • RTR operators receive lessons learned information based on the comparison of RTR and VE data • Identify corrective action steps (additional training) taken to address lessons learned	Y	Although CCP at LANL had generated two annual VE/RTR comparison reports, the RTR operators had not received any "lessons learned" training. EPA generated the following Concern to address this issue. LANL-CCP-RTR-06-008C: CCP at LANL has generated two (2) annual VE/RTR Comparison Reports but at the time of this inspection RTR operators had not received any "lessons learned" training on the discrepancies between the RTR and VE results.

Information Included in Batch Data Reports

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	Estimated weights for Waste Material Parameters	Y
Report date	Y	Layers of confinement	Y	Verification of waste Matrix Code	Y
Waste container number	Y	Indication of vented rigid liners	Y	Reference to or copies of any NCRs	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	Data generation checklists	Y
Videotape reference	Y	Amount of free liquid	Y	Data generation checklists	Y
QC documentation	Y	Container gross weight	Y	Project level checklists	Y
Verification that waste matches waste stream description	Y		Y		

ATTACHMENT A.6: VISUAL EXAMINATION (VE) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8 **Inspection Date: May 23 – 25, 2006**

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 CCP-TP-002, Rev. 20	Visual Examination Expert's (VEE) explanation of job duties was consistent with applicable procedures. 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	CCP uses Qualification Cards to document and record training received by CCP personnel. The SPM appoints Visual Examination Experts (VEE) and documents the selection in a letter that is included in the VEE's training file. During the inspection, the Qualification Cards for two VEEs were reviewed and found to be complete and current. Training on specific waste generating processes, typical packaging configurations, and WMPs that are expected in each waste stream is provided to the RTR personnel. However, this training is provided only once unless there is an update to the AK record. The site maintains a List of Qualified Individuals that is used to ensure training is current. Objective evidence: 1. Visual Examination Operator/ITR/TS/FQAO Qualification Card for two VEEs 2. List of Qualified Individuals for VE
VE-2: Procedures and technical guidance documents provide complete instructions for performing VE.	Y CCP-TP-113, Revision 4, s. 4.0, Tables 1-4	The site uses AK to identify the matrix parameter category and to estimate waste material parameters present. 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	Two types of VE were assessed during the inspection of LANL-CCP, namely VE in lieu of RTR and VE as a QC check of RTR. Procedure CCP-TP-113 contains complete and detailed instructions for performing VE as a QC check of RTR and VE in lieu of RTR. These two types of VE are performed in exactly the same manner and both are covered in section 4.1 of the procedure. The procedure also includes a list of WIPP prohibited items, a description of layers of confinement, a description of Waste Material Parameters (WMP), a look up table for waste item weights, and a table explaining the codes used to record some of the VE data. When a new AK summary becomes available, the operators receive documented training with regard to expected WMPs and packaging configurations in that waste stream.

ATTACHMENT A.6: VISUAL EXAMINATION (VE) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8 **Inspection Date: May 23 – 25, 2006**

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
VE-3:	Y CCP-TP-113, Revision 4, s. 3.2.3	Prior to starting the VE, the VEE reviews all documented data related to the waste container and its contents to ensure that there are no safety hazards for the VE operators.	Y	Objective evidence: 1. Audio/visual recording and BDRs for: LAVE540025 (VE in Lieu of RTR, S3000) LAVE540027 (VE as a QC Check of RTR, S3000) LAVE500060 (VE as a QC Check of RTR, S5000) LAVE500061 (VE as a QC Check of RTR, S5000)

ATTACHMENT A.6: VISUAL EXAMINATION (VE) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8 **Inspection Date: May 23 – 25, 2006**

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
VE-4: Procedure requires an audio/visual recording of the VE event to be recorded.	Y CCP-TP-113, Revision 4, s. 4.1.2	VEE/operator's explanation of how to operate the data recording system was consistent with applicable procedures. The video camera was focused prior to the start of VE. An audio/videotape is made of the waste container exam and maintained as a nonpermanent record. Data on the audio/visual recording is consistent with documentation.	Y	During the inspection, EPA observed VE in lieu of RTR for a debris (S5000) drum. The drum # was 601142 and the VE event took place in a glovebox in Room 102 of Building 69 at TA-50. The audio/visual check for the day of the demonstration had already been successfully performed prior to EPA's arrival. EPA did however verify that audio/visual checks were successfully completed by reviewing tapes for BDRs LAVE540025, LAVE540027, LAVE500060, LAVE500061, as well as the un-validated batch from the demonstration LAVE500081. Audio/visual tapes were reviewed in conjunction with the BDR to ensure consistency of the visual and written records. No discrepancies were identified for the BDRs reviewed. For the demonstration, the drum contents were emptied, sorted by WMP and weighed. EPA observed the scale calibration performed for this batch. The weights, recorded for leaded rubber gloves, were assigned as 60% rubber and 40% other metals. However, in RTR leaded rubber glove weights are assigned totally to rubber. EPA generated the following Concern for this discrepancy between RTR and VE (see also RTR checklist). LANL-CCP-VE-06-006CR: 1. Waste Material Parameter weights are inconsistently recorded for leaded rubber gloves. In RTR, leaded gloves are recorded as only under the rubber waste material parameter but in VE the weight of the gloves is assigned in the following way: 60% rubber and 40% other metals. 2. VE personnel were unable to provide the rationale for assigning the weights (60:40) in this manner. Objective evidence: 1. Audio/visual recording and BDRs for:

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				LAVE540025 (VE in Lieu of RTR, S3000) LAVE540027 (VE as a QC Check of RTR, S3000) LAVE500060 (VE as a QC Check of RTR, S5000) LAVE500061 (VE as a QC Check of RTR, S5000) LAVE500081 (VE in Lieu of RTR, S5000)
VE-5: There is a procedure for handling instances when the VE Expert is unable to see through the inner plastic bags/packages/containers of waste.	Y CCP-TP-113, Revision 4, s. 4.1.4, [D], [F.3](b)	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.	Y	It is CCP's policy to open all bags during VE although the VEE is permitted to document decisions with regard to opening bags in the BDR. There were numerous small cans contained in the drums from BDR LAVE500061 reviewed by EPA. The VE operators did not completely empty the cans prior to weighing and it was unclear how the operators provided a complete inventory of the items inside the cans and how they were able to verify the absence of prohibited items. The VE data forms did not include any justification for not emptying the cans. EPA generated the following concern to address this issue. LANL-CCP-VE-06-007CR: The containers examined by VE in BDR LAVE500061 (VE as a QC Check of RTR) contained numerous small cans that were opened but not empty during the VE event. CCP personnel were unable to demonstrate that all of the WMPs contained in the cans were inventoried and the VE procedure does not address this circumstance. Objective evidence: 1. Audio/visual recording and BDRs for: LAVE540025 (VE in Lieu of RTR, S3000) LAVE540027 (VE as a QC Check of RTR, S3000) LAVE500060 (VE as a QC Check of RTR, S5000) LAVE500061 (VE as a QC Check of RTR, S5000) LAVE500081 (VE in Lieu of RTR, S5000)

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
VE-6: The VE procedure requires verification of Waste Matrix Code and WMP weights.	Y CCP-TP-113, Revision 4, s. 4.1.4, Table 4, Attachment1	If an automated data entry system is used, data entry VE personnel could navigate through the various screens. A VE data form is used to document the matrix parameter category and estimated WMP weights of the waste. VE staff have access to standardized charts or tables to aid in the consistent estimation or assignment of weights, waste material parameters, and waste matrix codes. The estimated or weighed WMP weights are determined by compiling an inventory of waste items, residual materials and packaging materials. The items on the inventory list are sorted by WMP and combined with a standard weight look-up table to provide an estimate of WMP weights. References tables are updated as site gains information from VE. VEE verifies Waste Matrix Code and recommends changes as needed.	Y	CCP uses the WTS to enter data electronically. During the VE demonstration observed by EPA, the VEE was unable to explain how VE personnel verified that the waste examined matched the waste stream description. The VEE/operators did not have a hard copy or electronic version of the waste stream description available in the VE operations area and the VEE was not able to describe the expected WMPs in the waste stream they were examining. Accordingly, EPA generated the following Concern (see RTR-6): LANL-CCP-VE-06-005CR: Attachments used for data entry for both RTR and VE include a line item that requires operators to verify that the waste examined matches the Waste Stream description. The VEE for the VE demonstration and the operators of RTR units 1 and 2, observed by EPA on 5/24/06, could not explain how they were able to answer this question. These personnel did not have a copy of Waste Stream descriptions, e.g., CCP-LANL-AK-9, in their respective work areas nor were they able to describe the items included in the Waste Stream descriptions provided in the AK Summary for the waste stream they were currently examining. Prior to the March 6, 2007 meeting EPA reviewed a copy of the CCP RTR and VE Training Module (PowerPoint presentation) and the NDE RTR Comprehensive Examination. During the March 2007 meeting, EPA interviewed RTR operators who were able to correctly answer questions with regard to the data form items detailed above. The operators also demonstrated that they had access to both paper and electronic copies of the applicable waste stream description. EPA considers this concern to be closed. Objective evidence: 1. Audio/visual recording and BDRs for: LAVE540025 (VE in Lieu of RTR, S3000)

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				LAVE540027 (VE as a QC Check of RTR, S3000) LAVE500060 (VE as a QC Check of RTR, S5000) LAVE500061 (VE as a QC Check of RTR, S5000) LAVE500081 (VE in Lieu of RTR, S5000) 2. Visual Examination and Real-time Radiography Training 3. LANL – NDE RTR Comprehensive Examination
VE-7: Procedure provides instructions for processing of containers with prohibited items.	Y CCP-TP-113, Revision 4, s. 4.3, Table 1, Attachment 1, section 5	VE expert could name prohibited items. VE expert's explanation of required actions if prohibited items were encountered was consistent with procedure. The VEE describes any liquids found, including a description of their location in the container and estimated volume. Other prohibited items, including sealed containers are identified and segregated.	Y	The data form used lists prohibited items and the VEE/operators are required to answer the required questions. The default answers in the form are "No" for prohibited items. The quantity and location of prohibited liquid encountered in the RTR examinations of containers prior to May 2005 from waste stream number LA-MIN03-NC.001 were not predicted in the AK summary CCP-AK-LANL-004. Although characterization personnel initiated NCRs to address the presence of prohibited liquids, this information was not communicated to AK personnel to enable updating of the AK record. CCP personnel used VE in Lieu of RTR to characterize wastes from this same waste stream from May 4 through June 23, 2005. However, the presence of liquids made the use of this technique unsuitable for containers of S3000 wastes. Until corrective action is taken the use of this technique at CCP sites is unacceptable. EPA generated finding LANL-CCP-VE-06-004F to address this issue. NCRs were initiated as required. For example, NCRLANL-0911-05 was initiated for drums S814064, S810436, and S814194 (BDR LAVE540025) because of residual liquid >1% of the container volume. NCR LANL-0904-05 was initiated for container 55598 because the balance switched from Kg to lbs in the middles of the VE event. Objective evidence: 1. Audio/visual recording and BDRs for:

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				LAVE540025 (VE in Lieu of RTR, S3000) LAVE540027 (VE as a QC Check of RTR, S3000) LAVE500060 (VE as a QC Check of RTR, S5000) LAVE500061 (VE as a QC Check of RTR, S5000) LAVE500081 (VE in Lieu of RTR, S5000)
VE-8:	Y CCP-TP-113, Revision 4, s. 4.1.4, [C1] (a), [C8], Attachment 1, section 2	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	The gross weight of containers and volume utilization of the container are recorded in section 2 of Attachment 1 of the CCP Waste Visual Examination Data Form. Objective evidence: 1. Audio/visual recording and BDRs for: LAVE540025 (VE in Lieu of RTR, S3000) LAVE540027 (VE as a QC Check of RTR, S3000) LAVE500060 (VE as a QC Check of RTR, S5000) LAVE500061 (VE as a QC Check of RTR, S5000) LAVE500081 (VE in Lieu of RTR, S5000)
VE-9:	Y CCP-TP-113, Revision 4, s. 4.1.4 [C.1] (a), [C.4] (d), [H.3] (a), 4.3.2, 4.3.6, Attachment 1, section 1, Attachment 4, #8	The procedure is adequately implemented and corrective actions are taken when necessary.	Y	During the inspection, EPA observed VE in lieu of RTR for a debris (S5000) drum. The drum # was 601142 and the VE event took place in a glovebox in Room 102 of Building 69 at TA-50. The audio/visual check for the day of the demonstration had already been successfully performed prior to EPA's arrival. EPA did however verify that audio/visual checks were successfully completed by reviewing tapes for BDRs LAVE540025, LAVE540027, LAVE500060, LAVE500061, and the un-validated batch from the demonstration LAVE500081. Audio/visual tapes were reviewed in conjunction with the BDR to ensure consistency of the visual and written records. No discrepancies were identified for the BDRs reviewed and all required information was recorded. For the demonstration, the drum contents were emptied, sorted by WMP and weighed. EPA observed the scale calibration performed for this batch.

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				NCRs were initiated as required. For example, NCR LANL-0911-05 was initiated for drums S814064, S810436, and S814194 (BDR LAVE540025) because of residual liquid >1% of the container volume. NCR LANL-0904-05 was initiated for container 55598 because the balance switched from Kg to lbs in the middles of the VE event. Objective evidence: 1. Audio/visual recording and BDRs for: LAVE540025 (VE in Lieu of RTR, S3000) LAVE540027 (VE as a QC Check of RTR, S3000) LAVE500060 (VE as a QC Check of RTR, S5000) LAVE500061 (VE as a QC Check of RTR, S5000) LAVE500081 (VE in Lieu of RTR, S5000)
VE-10: Site procedure(s) require data generation and project level reviews of Batch Data Reports (BDRs).	Y CCP-TP-113, Revision 4, s. 4.6-4.8, Attachment 2-4 CCP-TP-001, Rev. 11	BDRs contain all required information (see table below). Data generation and project level reviews are complete.	Y	The BDRs listed below contained completed data generation and project level review checklists. BDRs contained all of the required information. Objective evidence: 1. Audio/visual recording and BDRs for: LAVE540025 (VE in Lieu of RTR, S3000) LAVE540027 (VE as a QC Check of RTR, S3000) LAVE500060 (VE as a QC Check of RTR, S5000) LAVE500061 (VE as a QC Check of RTR, S5000)
VE-11: The site has a procedure for using the data obtained from VE as a QC check of RTR to calculate the percentage of miscertified waste containers.	Y CCP-TP-113, Rev. 4, s. 4.1 CCP-TP-003, Rev. 14, s. 4.7, A13, Rev. 0	The number of waste containers to undergo VE is appropriately calculated. The site uses an initial miscertification rate of 11%. Miscertification rate is calculated for each applicable Summary Category Group after 6	Y	The table used for determining the number of containers requiring VE is a duplicate of that in WAP, Table B2-1(CCP-TP-003, Table 1). Memoranda: 3/30/05, 2005 Selection of Visual Examination Drums from S3000 Summary Category Group; 6/27/05, 2005 Selection of Visual Examination Drums from S3000 Summary Category Group identify the containers to undergo

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
The facility has a procedure for randomly selecting waste containers.	CCP-TP-003, Rev. 14, A13, Rev. 0	months or 50% of the SCG have undergone RTR. Site uses 1% miscertification rate if calculated value is <1%. Rate is reassessed annually using a drum-weighed average.		VE and a list of replacement container numbers. Letter: 3/23/0, 2006 Selection of Visual Examination Drums from S3000 and S5000 Category Groups document the random selection of drums to be examined for calculation of the miscertification rate as well identifying replacement drums. EPA also reviewed memoranda: 4/26/05, Initial Summary Category Group-Specific S3120 Miscertification Rate; and 3/29/05, Initial Summary Category Group-Specific S5000 Miscertification Rate that documented the initial rates calculated for these SCGs. Section 4.11 requires that a container-weighted average of historic site-specific miscertifcation rates be calculated. This was evidenced by review of a 2/10/06 letter that included the container weighted site-specific rate calculation. Objective evidence: 1. Memorandum dated 3/30/05, 2005 Selection of Visual Examination Drums from S3000 Summary Category Group and memorandum dated 6/27/05, 2005 Selection of Visual Examination Drums from S3000 Summary Category Group 2. Letter dated 3/23/06, 2006 Selection of Visual Examination Drums from S3000 and S5000 Category Groups 3. Memorandum dated 2/10/06, LANL Annual Reassessment of the Site Specific Miscertification Rate (S3000 and S5000) 4. Memorandum dated 3/29/05, Initial Summary Category Group-Specific S5000 Miscertification Rate 5. Memorandum dated 4/26/05, Initial Summary Category Group-Specific S3120 Miscertification Rate

ATTACHMENT A.6: VISUAL EXAMINATION (VE) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8 **Inspection Date: May 23 – 25, 2006**

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
VE-12: The site has a documented stratagem for selecting replacement waste containers.	Y CCP-TP-003, Revision 14, s. 4.12 & 4.13	If fewer containers were visually examined than were sampled, the reason for excluding the containers is documented. The replacement stratagem is restricted to containers from the same waste stream. VE is performed on the replacement containers.	Y	When CCP selects the containers for VE as a QC Check pf RTR, extra containers are randomly selected so that replacement containers are available if needed. The reason for excluding containers in the original selection is documented. EPA reviewed the status of containers selected and reasons for rejection on a list provided by CCP. Objective evidence: 1. Status report for containers used to calculate miscertification rate, including reasons for container rejection.
VE-13: The calculation used for the miscertification rate is documented.	Y CCP-TP-003, Revision 14, s. 4.9-4.11	After the required number of containers have been visually examined, the UCL_{90} for the proportion miscertified is calculated. The site has used the appropriate distribution for the UCL_{90} calculation to determine N.	Y	The table used for determining the number of containers requiring VE is a duplicate of that in WAP, Table B2-1. The calculations used were appropriate and documented. Objective evidence: 1. Memorandum dated 4/26/05, Initial Summary Category Group-Specific S3120 Miscertification Rate 2. Memorandum dated 3/29/05, Initial Summary Category Group-Specific S5000 Miscertification Rate. 3. Memorandum dated 2/10/06, Los Alamos National Laboratory Annual Reassessment of the Site Specific Annual Miscertification Rate (S3000 and S5000)
VE-14: Site procedure requires that results of VE as a QC check of RTR are forwarded to the radiography facility.		RTR operators receive results of RTR/VE comparison.	Y	Memoranda: 4/12/05, Waste Material Parameter Weight Comparison Report for Los Alamos National Laboratory April 2004 Through March 2005 (Relative Percent Difference Comparison Report for Radiography and Visual Examination); 5/26/05, Waste Material Parameter Weight Comparison Report for Los Alamos National Laboratory June 2004 Through April 2005 (Relative Percent Difference Comparison Report for Radiography and Visual

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				Examination): Waste Stream LA-MIN03-NC.001; 2/7/065, Waste Material Parameter Weight Comparison Report for Los Alamos National Laboratory April 2005 Through December 2005 (Relative Percent Difference Comparison Report for Radiography and Visual Examination) document the RTR/VE comparisons performed in order to calculate the miscertification rates. At the time of the inspection, "lessons learned" training had not been provided to the RTR operators. EPA generated the following concern to address this issue: LANL-CCP-RTR-06-008C: CCP at LANL has generated two (2) annual VE/RTR Comparison Reports but at the time of this inspection RTR operators had not received any "lessons learned" training on the discrepancies between the RTR and VE results. Objective evidence: 1. Memorandum dated 4/12/05, Waste Material Parameter Weight Comparison Report for Los Alamos National laboratory April 2004 Through March 2005 (Relative Percent Difference Comparison Report for Radiography and Visual Examination) 2. Memorandum dated 5/26/05, Waste Material Parameter Weight Comparison Report for Los Alamos National laboratory June 2004 Through April 2005 (Relative Percent Difference Comparison Report for Radiography and Visual Examination): Waste Stream LA-MIN03-NC.001 3. Memorandum dated 2/7/065, Waste Material Parameter Weight Comparison Report for Los Alamos National laboratory April 2005 Through December 2005 (Relative Percent Difference Comparison Report for Radiography and Visual Examination) document the RTR/VE

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				comparisons performed in order to calculate the miscertification rates.

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 data generation checklists	Y
QC documentation	Y	Container gross weight	Y	Completed project level checklists	Y
Verification that waste matches waste stream description	Y	Waste Material Parameters weights	Y		

ATTACHMENT A.7: VISUAL EXAMINATION TECHNIQUE (VET) FOR OFF-SITE SOURCE RECOVERY PROGRAM (OSRP) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8 **Inspection Date:** August 22, 2006

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
OSRP-1: Procedures identify required training and qualifications for VE personnel.	CCP-TP-069, R. 3, s. 2.2.1 CCP-QP-002, R. 21	• VE personnel's training was consistent with applicable procedures. • VE personnel's certification is current. • VE personnel are re-qualified every two years		CCP-QP-002, R. 21 does not contain any training requirements for VE operators/ITR/TS/FQAO for CH waste.
OSRP-2: Equipment required	CCP-TP-069, R. 3, s.2.4.1	Calibrated torque wrench	Y	EPA observed the correct use of the calibrated torque wrench during the inspection (torque wrench ID # 026327, calibration expires 12/20/06). The wrench had a maximum limit of 150 ft lbs. Prior to arriving at each recovery site, LANL personnel ship the required equipment to the site to facilitate operations.
OSRP-3: Procedures and technical guidance documents provide complete instructions for performing VE	CCP-TP-069, R. 3, s. 4.0	• VE operator and VE packager required (both VE operators) • Attachment 4	Y	EPA observed the packaging of four ^{241}Am (80 mCi each) sources at Radiation Technology, Inc located at 8407 Skyline Avenue, Odessa, TX. The LANL personnel who performed this VE event were a VE operator, a VE packager, and an RCT. Prior to arriving at the site, the LANL personnel compile a work plan that includes information on isotopes, activity, AK summary and waste stream description, as available. The special form capsule was inspected for usability at the start of the process in accordance with LANL procedure. The VE operator inspected the sources to identify any identification markings. No such markings were found on the sources to be packaged. Prior to being loaded, the special form capsule is etched with information about the sealed sources to be placed in it (this is not required by CCP-TP-069 but is by OSR-OP-170, Section. 7.3 c).

EPA Inspection No.: EPA-LANL-CCP-05.06-8 **Inspection Date:** August 22, 2006

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				Attachment 4 of procedure CCP-TP-069 was electronically completed by the VE operator as information became available. The data recorded include the presence/absence of prohibited items, WMC, POC and drum closure. Other information included: Drum # LA00000062745; Filter # NucFil-013, serial # LC-734, date 12/02; POC filter UT9400, serial # 025194, date Jan 2003, S100 (6" pipe component); Capsule model # II-1-0268; Outside TID # LANL 001416.
OSRP-4: VE operator verifies:	CCP-TP-069, R. 3, s. 4.1.5	• Source meets applicable regulatory definitions • Outer casing made of non volatile organic material • Source is or is contained in rigid sealed container ≤ 4 liters • Items match the waste stream description, WMC, and physical form/SCG provided by AK • No non-packaging items placed in the container other than sources • No more than 2 layers of confinement • Source loaded using tongs or special tool	Y	The VE operator electronically entered this information into Attachment 4 during the VE event. Initially the VE operator could not locate the waste stream description for the subject sources (AK summary Report AK-LANL-08, R.4) but was able to obtain this information from LANL during the course of the VE event. For packaging of these four sources there was only one layer of confinement.

ATTACHMENT A.7: VISUAL EXAMINATION TECHNIQUE (VET) FOR OFF-SITE SOURCE RECOVERY PROGRAM (OSRP) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8 **Inspection Date:** August 22, 2006

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
OSRP-5:	CCP-TP-069, R. 3, s. 4.0	Attachment 4 completed: • Sealed source description and identifier • WMP category from Attachment 1 • Estimated weight • Item information verified during VE • Absence/presence of prohibited items		Attachment 4 was completed as required and verified and signed by both the VE operator and the VE packager. Weights for items commonly encountered during sealed source packaging activities are contained in Attachment 2 of procedure CCP-TP-069. The WMP assigned, from Attachment 1, was OM (other metals). The absence/presence of prohibited items is recorded in the Prohibited Hazardous Items and Conditions section of Attachment 4.
OSRP-6: Closing POC	CCP-TP-069, R. 3, s. 4.1.14 – 4.1.20	• Ensure serial #s on POC and lid match • Insert bolts • Tighten bolts using criss-cross pattern • Torque the 12" POC to 65 ft-lb (± 5 ft-lbs) • Torque the 6" POC to 40 ft-lb (± 4 ft-lbs) • Retorque the bolts going clockwise • Record torque value, wrench ID #, cal due date	Y	EPA observed the VE event for four ^{241}Am sources. The closure procedures for both the POC and drum were observed and were determined to be in accordance with the requirements of procedure CP-TP-069.
OSRP-7: Closing drum	CCP-TP-069, R. 3, s. 4.1.21	• Plastic bag closed with horsetail (if present) • Install closure ring • Torque bolt to 40 ft-lb (± 4 ft-lbs) • Record torque value, wrench ID #, cal due date • Apply TID to drum	Y	The VE operator attached security tape to the POC after closure. This security measure is required by LANL but is not required by CCP-TP-069. The CCP procedure requires a TID to be attached to the closure bolt of the drum; placement of TID was observed by EPA.

ATTACHMENT A.7: VISUAL EXAMINATION TECHNIQUE (VET) FOR OFF-SITE SOURCE RECOVERY PROGRAM (OSRP) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8 **Inspection Date:** August 22, 2006

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
OSRP-8: BDR assembled by VE operator	CCP-TP-069, R. 3, s. 4.2.1	• Cover page (attachment 5) • Table of Contents (attachment 6) • ITR checklist (attachment 7) • TS checklist (attachment 8) • FQAO checklist (attachment 9) • Container Packaging and VE data record (attachment 4) • NCRs if applicable • AK documentation identifier • Sources in Special Form Capsules • Radiological Contamination Surveys • Special Form Documentation • Source Markings		
OSRP-9: BDR		• Assign a unique BDR #, eg LAyy-OSR-VE-nnn, and record on attachment 5 • Record waste stream name and number and container type on attachment 5 • Record container ID # for each container included in the BDR on attachment 5		
OSRP-10: Data generation level review		• ITR, attachment 7 • TS, attachment 8 • FQAO, attachment 9		LANL personnel (ITR/TS/FQAO) perform data generation level reviews

ATTACHMENT A.7: VISUAL EXAMINATION TECHNIQUE (VET) FOR OFF-SITE SOURCE RECOVERY PROGRAM (OSRP) CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8 **Inspection Date:** August 22, 2006

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
OSRP-11: Project level review		• SPM • SQAO		CCP personnel perform project level reviews.

ATTACHMENT A.8: WIPP WASTE INFORMATION SYSTEM CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8 **Inspection Date: May 23 – 25, 2006**

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 CCP-QP-002, R. 20, CCP-TP-030, R. 18, s. 2.2.1	• 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	Training for data entry personnel (now WCA, Waste Certification Assistant) includes the WIPP Waste Information System User's Manual and the applicable site procedures. The WWIS Data Administrator provides each trainee with orientation to WWIS but this training is not documented. WCO/WCAs are based in Carlsbad, NM but a WCO was available at LANL to demonstrate the WWIS processes used. All CCP data entry into WWIS takes place in Carlsbad. The training record, contained in the personnel Qualification Card, for a WCA was reviewed during the on-site inspection. The training qualification card for the WCO interviewed had previously been reviewed during baseline inspections at other CCP sites. The training was complete and appropriate for these positions. The WCO and/or WCA build a file that contains all characterization/certifcation data for each container to be entered into WWIS. Personnel are able to access Batch Data Report (BDR) information for each container from the PTS (Project Office Tracking System). This administrative system is used to identify containers that are fully characterized and eligible for WWIS entry. Objective evidence reviewed: 1. Qualification Cards for Waste Certification Assistant (WCA)

ATTACHMENT A.8: WIPP WASTE INFORMATION SYSTEM CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8 **Inspection Date: May 23 – 25, 2006**

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
WWIS-2: Security measures for ensuring data integrity and accessing WWIS are sufficient.	Y CCP-TP-030, R. 18, 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	Access to WWIS is controlled by the WWIS Data Administrator. CCP requests access for personnel and the approval and password is transmitted to CCP via e-mail. WWIS access log is maintained by the WWIS Data Administrator in Carlsbad, NM. Objective evidence reviewed: 1. E-mail, dated 7/27/05, granting WWIS access to WCA
WWIS-3: There are adequate procedures for entering data into the WWIS and transmitting data to WIPP.	Y CCP-TP-030, R. 18, s. 3.0, 4.0	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	Data entry for all CCP sites takes place in Carlsbad, NM. For the purpose of demonstration, a WCO was present at LANL for this inspection. The WWIS Data Entry Summary –Characterization and Certification, which is an Excel spreadsheet, is used to enter characterization/certification data. After completion, the spreadsheet is printed and reviewed. By signing this summary, the WCO accepts the data for submission to WWIS. After the spreadsheet data have been approved by the WCO, ASCII, tab-delimited text files are generated and then submitted to WWIS. The Excel spreadsheet is controlled by software QA. All NCRs must be closed prior to data entry. Dean Mooney verifies NCR closure and informs the WCO of containers that are eligible for data entry into WWIS. After acceptance by WWIS, container information can be accessed by the Waste Container Data Report. Objective evidence reviewed: 1. WWIS Data Entry Summary –Characterization and Certification for container LA00000059179 2. WWIS Data Entry Summary – Characterization and Certification for container LAS811270

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				3. Waste Container Data Report for container LA00000052034 4. Waste Container Data Report for container LA00000061956 5. E-mail, dated 5/11/06, from Dean Mooney with regard to NCR/CAR dispositions for Lot LANL 701 6. List of NCR/CAR status for selected containers 7. WCO Data Entry Activities, Data Checklist for Containers to be Shipped, container LAS811270
WWIS-4: Procedures require that only verified and validated data are entered into WWIS.	Y CCP-TP-030, R. 18, s. 4.3, 4.4	Data generation and project level reviews of container data for WWIS entry have been performed and review checklists are complete.	Y	When all reviews have been completed, the Site Project Manager (SPM) notifies the WCO/WCAs that a lot evaluation is complete by issuing a CIS (container information summary). The administrative controls used by CCP ensure that only containers that have been through both levels of review are available for WWIS submission. As part of this inspection, the EPA inspector reviewed RTR and VE BDRs all of which contained complete review checklists. Objective evidence reviewed: 1. Correlation of Container Identification, Numbers to Batch Data Report Numbers. 2. BDRs LAVE540025, LAVE540027, LAVE500060, LAVE500061, LA-RTR2-05-0194, LA-RTR2-05-00123, LA-RTR2-05-0152, LA-RTR2-05-0175, LA-RTR12-06-0002, LA-RTR12-06-0001, LA-RTR12-06-0003

ATTACHMENT A.8: WIPP WASTE INFORMATION SYSTEM CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8 **Inspection Date: May 23 – 25, 2006**

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
WWIS-5: Procedures include instructions for submission of data into the Characterization and the Certification module of WWIS.	Y CCP-TP-030, R. 18, s. 4.4, 4.5	• 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	Characterization data are entered into the Characterization Module of WWIS so that a Waste Stream Profile Form can be approved. Because the data fields in the Characterization Module are a subset of those in the Certification Module, characterization data can be electronically transferred into the Certification Module. Spot checks of electronically entered data are performed but 100% of manually entered data are checked for accuracy. The checks use the paper copy of BDRs and the WCO/WCA makes manual corrections to the data. Any changes made are recorded in the BDR. The WCO is permitted to calculate the Methane concentration from the Hydrogen concentration if methane is flagged "U". An Excel spreadsheet, WWIS Data Entry Summary –Characterization and Certification, is used to ensure that all data are entered and are correct prior to uploading to WWIS. This spreadsheet contains many of the same data checks as WWIS. Before WWIS submission the WCO must accept the data by signing the Excel spreadsheet. Objective evidence reviewed: 1. WWIS Data Entry Summary –Characterization and Certification for container LA00000059179 2. WWIS Data Entry Summary – Characterization and Certification for container LAS811270 3. Waste Container Data Report for container LA00000052034

ATTACHMENT A.8: WIPP WASTE INFORMATION SYSTEM CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8 **Inspection Date: May 23 – 25, 2006**

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				4. Waste Container Data Report for container LA00000061956 5. Waste Stream Profile Form, LA-MHD02.001

ATTACHMENT A.8: WIPP WASTE INFORMATION SYSTEM CHECKLIST

EPA Inspection No.: EPA-LANL-CCP-05.06-8 **Inspection Date: May 23 – 25, 2006**

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 CCP-TP-030, R. 18, s. 4.3, 4.4	• 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	Characterization data are entered into the Characterization Module of WWIS so that a Waste Stream Profile Form can be approved. Because the data fields in the Characterization Module are a subset of those in the Certification Module, characterization data can be electronically transferred into the Certification Module. Spot checks of electronically entered data are performed but 100% of manually entered data are checked for accuracy. The checks use the paper copy of BDRs and the WCO/WCA makes manual corrections to the data. Any changes made are recorded on the BDRs. The WCO accepts data for WWIS submission by signing the Excel spreadsheet. WWIS contains checks that do not allow incorrect or unusable data to be uploaded. CCP uses the PTS to identify containers that are fully characterized and eligible for WWIS submission. Objective evidence reviewed: 1. WWIS Data Entry Summary –Characterization and Certification for container LA00000059179 2. WWIS Data Entry Summary – Characterization and Certification for container LAS811270 3. Waste Container Data Report for container LA00000052034 4. Waste Container Data Report for container LA00000061956 5. E-mail, dated 5/11/06, from Dean Mooney with regard to NCR/CAR dispositions for Lot LANL 701

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				6. List of NCR/CAR status for selected containers 7. WCO Data Entry Activities, Data Checklist for Containers to be Shipped, container LAS811270
WWIS-7: There are adequate procedures for entering data into the WWIS and transmitting the data to WIPP.	Y CCP-TP-030, R. 18, s. 4.3, 4.4, 4.5	The site has successfully submitted characterization and certification data to WIPP via WWIS.	Y	CCP at LANL has successfully submitted characterization and certification data for many containers to WIPP via WWIS (2270 already disposed and 298 presently certified). The WCO was able to access to multiple certified containers to demonstrate CCP's processes. LANL site identification number is C4. Objective evidence reviewed: 1. WWIS Data Entry Summary –Characterization and Certification for container LA00000059179 2. WWIS Data Entry Summary – Characterization and Certification for container LAS811270 3. Waste Container Data Report for container LA00000052034 4. Waste Container Data Report for container LA00000061956
WWIS-8: Procedures provide instructions for data correction if data are rejected by WWIS.	Y CCP-TP-030, R. 18, s. 4.5.17, 4.5.18	• 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	Y	WWIS contains checks that do not allow incorrect or unusable data to be uploaded. If a problem with data is detected by WWIS, the entry screen flashes red to indicate which data are not acceptable. The WCO/WCA is then able to identify the problem with the data and correct it. The Excel spreadsheet, used to compile the data for WWIS entry, contains

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				many of the same checks as WWIS. After data are accepted by WWIS, an e-mail is sent to CCP informing the WCO/WCA that the data are accepted. WWIS contains codes that indicate the status of entered data. Objective evidence reviewed: 1. WWIS Data Entry Summary –Characterization and Certification for container LA00000059179 2. WWIS Data Entry Summary – Characterization and Certification for container LAS811270 3. Waste Container Data Report for container LA00000052034 4. Waste Container Data Report for container LA00000061956
WWIS-9: Procedures for waste container characterization/certification data submittal to WWIS require the appropriate records to be retained.	Y CCP-TP-030, R. 18, s. 5.0	• WWIS access requests • WWIS access logs • Waste container data input reports	Y	The WCO demonstrating CCP's WWIS processes was able to retrieve all records requested by EPA. Data access logs are retained by the WWIS Data Administrator in Carlsbad, NM. Access to WWIS is requested by CCP and granted via email by the WWIA Data Administrator. Objective evidence reviewed: 1. E-mail, dated 7/27/05, granting WWIS access to WCA 2. WWIS Data Entry Summary –Characterization and Certification for container LA00000059179 3. WWIS Data Entry Summary – Characterization and Certification for container

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				LAS811270 4. Waste Container Data Report for container LA00000052034 5. Waste Container Data Report for container LA00000061956
WWIS-10:	NA	• Plans and procedures for payload management have been approved by CBFO. • CBFO informed EPA prior to approving the site to use payload management for containers. • TRU alpha activity concentration is > 100 nCi/g for the entire waste stream. • Only waste containers from the same waste 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.	NA	CCP at LANL does not intend to payload manage containers.

WWIS Data Requirements
Characterization Module Data Fields
(not a complete list)

Container ID - present	Pu 239 equivalent activity - present
Generator EPA ID - present	Pu 239 fissile gram equivalent - present
Site ID - present	Pu 239 FGE 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 - present
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.22

ATTACHMENT B.1 REPLICATE TESTING DATA FOR CONTAINER 52331, HENC #1 SYSTEM

Instrument: HENC#1
Container: 52331

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	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{234}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}Pu Activity (Ci)	6.77E-01	1.14E-01	1.68E-01	8.06E-01	1.60E-01	1.99E-01	4.51E-01	5.05E-02	1.12E-01
^{239}Pu Activity (Ci)	9.71E+00	2.34E+01	2.41E+00	9.64E+00	2.29E+01	2.38E+00	9.69E+00	2.34E+01	2.41E+00
^{240}Pu Activity (Ci)	2.63E+00	1.71E+00	6.52E-01	2.71E+00	1.81E+00	6.68E-01	2.77E+00	1.91E+00	6.90E-01
^{242}Pu Activity (Ci)	2.66E-04	1.75E-08	6.59E-05	2.73E-04	1.84E-08	6.75E-05	2.80E-04	2.00E-08	7.16E-05
^{241}Am Activity (Ci)	3.87E+00	3.72E+00	9.60E-01	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{90}Sr Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{137}Cs Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
TRU Alpha Conc. (nCi/g)	4.25E+05	2.87E+10	6.75E+04	4.30E+05	2.88E+10	6.70E+04	4.27E+05	2.90E+10	6.80E+04

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	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{234}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}Pu Activity (Ci)	7.41E-01	1.34E-01	1.81E-01	9.34E-01	2.14E-01	2.29E-01	4.97E-01	6.11E-02	1.23E-01
^{239}Pu Activity (Ci)	9.55E+00	2.23E+01	2.34E+00	9.58E+00	2.25E+01	2.35E+00	9.67E+00	2.32E+01	2.40E+00
^{240}Pu Activity (Ci)	2.80E+00	1.92E+00	6.86E-01	2.71E+00	1.80E+00	6.65E-01	2.74E+00	1.86E+00	6.80E-01
^{242}Pu Activity (Ci)	2.83E-04	1.96E-08	6.92E-05	2.74E-04	1.84E-08	6.72E-05	2.82E-04	1.97E-08	7.00E-05
^{241}Am Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{90}Sr Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{137}Cs Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
TRU Alpha Conc. (nCi/g)	4.28E+05	2.83E+10	6.61E+04	4.30E+05	2.85E+10	6.62E+04	4.25E+05	2.87E+10	6.76E+04

ATTACHMENT B.2 REPLICATE TESTING RESULTS FOR CONTAINER 52331, HENC #1 SYSTEM

Instrument: HENC#1
Container: 52331

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)	6.77E-01	1.14E-01	6.86E-01	2.06E-01	3.00E-01	1.31E+01	1.06E-02	-3.90E-02	9.71E-01
^{239}Pu Activity (Ci)	9.71E+00	2.34E+01	9.63E+00	5.94E-02	6.17E-03	2.58E-05	1.00E+00	1.29E+00	2.66E-01
^{240}Pu Activity (Ci)	2.63E+00	1.71E+00	2.75E+00	3.91E-02	1.42E-02	2.08E-03	1.00E+00	-2.71E+00	5.37E-02
^{242}Pu Activity (Ci)	2.66E-04	1.75E-08	2.78E-04	4.62E-06	1.66E-02	2.77E+05	0.00E+00	-2.45E+00	7.02E-02
^{241}Am Activity (Ci)	3.87E+00	3.72E+00	0.00E+00	0.00E+00	N/A	0.00E+00	1.00E+00	N/A	N/A
^{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)	4.25E+05	2.87E+10	4.28E+05	2.12E+03	4.96E-03	2.19E-14	1.00E+00	-1.29E+00	2.66E-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)	Significant	Not Significant
^{239}Pu Activity (Ci)	Not Significant	Not Significant
^{240}Pu Activity (Ci)	Not Significant	Not Significant
^{242}Pu Activity (Ci)	Highly Significant	Not Significant
^{241}Am Activity (Ci)	Not Significant	Not Applicable
^{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 CONTAINER 52476, HENC #1 SYSTEM

Instrument: **HENC#1**
Container: **52476**

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	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{234}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}Pu Activity (Ci)	1.34E+00	5.13E-01	3.83E-01	1.46E+00	6.25E-01	4.28E-01	1.41E+00	5.80E-01	4.11E-01
^{239}Pu Activity (Ci)	9.75E+00	1.43E+01	1.47E+00	1.04E+01	1.87E+01	1.80E+00	1.00E+01	1.71E+01	1.71E+00
^{240}Pu Activity (Ci)	8.98E+00	1.26E+01	1.40E+00	9.61E+00	1.63E+01	1.70E+00	9.26E+00	1.50E+01	1.62E+00
^{242}Pu Activity (Ci)	4.43E-03	4.32E-06	9.76E-04	4.75E-03	5.32E-06	1.12E-03	4.58E-03	4.90E-06	1.07E-03
^{241}Am Activity (Ci)	2.12E+01	1.30E+02	6.12E+00	1.54E+01	1.26E+02	8.18E+00	0.00E+00	N/A	0.00E+00
^{90}Sr Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{137}Cs Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
TRU Alpha Conc. (nCi/g)	4.51E+05	1.77E+10	3.93E+04	4.94E+05	5.73E+10	1.16E+05	4.84E+05	5.47E+10	1.13E+05

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	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{234}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}Pu Activity (Ci)	1.41E+00	5.84E-01	4.14E-01	1.40E+00	5.74E-01	4.10E-01	1.47E+00	6.34E-01	4.31E-01
^{239}Pu Activity (Ci)	1.01E+01	1.75E+01	1.73E+00	1.00E+01	1.72E+01	1.72E+00	1.05E+01	1.90E+01	1.81E+00
^{240}Pu Activity (Ci)	9.30E+00	1.52E+01	1.63E+00	9.22E+00	1.49E+01	1.62E+00	9.66E+00	1.65E+01	1.71E+00
^{242}Pu Activity (Ci)	4.60E-03	4.97E-06	1.08E-03	4.55E-03	4.87E-06	1.07E-03	4.77E-03	5.39E-06	1.13E-03
^{241}Am Activity (Ci)	1.37E+01	3.27E+01	2.39E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{90}Sr Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{137}Cs Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
TRU Alpha Conc. (nCi/g)	4.67E+05	2.14E+10	4.59E+04	4.82E+05	5.40E+10	1.12E+05	4.95E+05	5.59E+10	1.13E+05

ATTACHMENT B.4 REPLICATE TESTING RESULTS FOR CONTAINER 52476, HENC #1 SYSTEM

Instrument: HENC#1
Container: 52476

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)	1.34E+00	5.13E-01	1.43E+00	3.24E-02	2.27E-02	1.59E-02	1.00E+00	-2.54E+00	6.43E-02
^{239}Pu Activity (Ci)	9.75E+00	1.43E+01	1.02E+01	2.35E-01	2.30E-02	1.07E-03	1.00E+00	-1.75E+00	1.55E-01
^{240}Pu Activity (Ci)	8.98E+00	1.26E+01	9.41E+00	2.08E-01	2.21E-02	1.10E-03	1.00E+00	-1.89E+00	1.32E-01
^{242}Pu Activity (Ci)	4.43E-03	4.32E-06	4.65E-03	1.02E-04	2.20E-02	2.24E+03	0.00E+00	-1.96E+00	1.21E-01
^{241}Am Activity (Ci)	2.12E+01	1.30E+02	5.82E+00	7.99E+00	1.37E+00	1.52E-02	1.00E+00	1.76E+00	1.54E-01
^{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)	4.51E+05	1.77E+10	4.84E+05	1.13E+04	2.34E-02	1.63E-12	1.00E+00	-2.69E+00	5.46E-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)	Highly 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.5 REPLICATE TESTING DATA FOR CONTAINER 53093, HENC #1 SYSTEM

Instrument: **HENC#1**
Container: **53093**

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	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{234}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}Pu Activity (Ci)	5.14E-01	5.91E-02	1.15E-01	5.66E-01	7.87E-02	1.39E-01	4.42E-01	4.55E-02	1.03E-01
^{239}Pu Activity (Ci)	8.84E+00	1.75E+01	1.98E+00	9.67E+00	2.30E+01	2.38E+00	9.17E+00	1.96E+01	2.14E+00
^{240}Pu Activity (Ci)	2.59E+00	1.50E+00	5.81E-01	2.55E+00	1.60E+00	6.29E-01	2.54E+00	1.51E+00	5.93E-01
^{242}Pu Activity (Ci)	2.57E-04	1.48E-08	5.77E-05	2.61E-04	1.68E-08	6.44E-05	2.61E-04	1.59E-08	6.09E-05
^{241}Am Activity (Ci)	4.00E+00	3.95E+00	9.87E-01	0.00E+00	N/A	0.00E+00	3.91E+00	3.57E+00	9.13E-01
^{90}Sr Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{137}Cs Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
TRU Alpha Conc. (nCi/g)	4.59E+05	3.01E+10	6.55E+04	4.95E+05	3.89E+10	7.85E+04	4.74E+05	3.36E+10	7.09E+04

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	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{234}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}Pu Activity (Ci)	5.50E-01	7.32E-02	1.33E-01	4.51E-01	4.87E-02	1.08E-01	4.61E-01	4.98E-02	1.08E-01
^{239}Pu Activity (Ci)	9.50E+00	2.18E+01	2.29E+00	9.42E+00	2.12E+01	2.25E+00	9.23E+00	2.00E+01	2.17E+00
^{240}Pu Activity (Ci)	2.51E+00	1.52E+00	6.06E-01	2.59E+00	1.60E+00	6.18E-01	2.65E+00	1.65E+00	6.21E-01
^{242}Pu Activity (Ci)	2.58E-04	1.60E-08	6.22E-05	2.62E-04	1.64E-08	6.27E-05	2.67E-04	1.67E-08	6.26E-05
^{241}Am Activity (Ci)	4.02E+00	3.90E+00	9.69E-01	3.95E+00	3.72E+00	9.43E-01	3.87E+00	3.51E+00	9.08E-01
^{90}Sr Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{137}Cs Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
TRU Alpha Conc. (nCi/g)	4.89E+05	3.70E+10	7.57E+04	4.84E+05	3.60E+10	7.44E+04	4.78E+05	3.43E+10	7.17E+04

ATTACHMENT B.6 REPLICATE TESTING RESULTS FOR CONTAINER 53093, HENC #1 SYSTEM

Instrument: HENC#1
Container: 53093

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)	5.14E-01	5.91E-02	4.94E-01	5.91E-02	1.20E-01	4.00E+00	4.07E-01	3.09E-01	7.73E-01
^{239}Pu Activity (Ci)	8.84E+00	1.75E+01	9.40E+00	2.03E-01	2.16E-02	5.39E-04	1.00E+00	-2.51E+00	6.62E-02
^{240}Pu Activity (Ci)	2.59E+00	1.50E+00	2.57E+00	5.40E-02	2.10E-02	5.16E-03	1.00E+00	3.72E-01	7.29E-01
^{242}Pu Activity (Ci)	2.57E-04	1.48E-08	2.62E-04	3.27E-06	1.25E-02	1.95E+05	0.00E+00	-1.34E+00	2.51E-01
^{241}Am Activity (Ci)	4.00E+00	3.95E+00	3.15E+00	1.76E+00	5.59E-01	7.97E-01	9.39E-01	4.40E-01	6.82E-01
^{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)	4.59E+05	3.01E+10	4.84E+05	8.40E+03	1.73E-02	3.12E-13	1.00E+00	-2.72E+00	5.31E-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)	Highly 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 CONTAINER D52277, HENC #2 SYSTEM

Instrument: **HENC#2**
Container: **D52277**

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	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{234}U Activity (Ci)	9.94E-04	5.38E-05	5.41E-02	1.05E-03	5.68E-05	5.41E-02	1.01E-03	6.19E-05	6.13E-02
^{238}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}Pu Activity (Ci)	6.37E+00	9.39E-01	1.47E-01	6.76E+00	9.99E-01	1.48E-01	6.46E+00	9.50E-01	1.47E-01
^{239}Pu Activity (Ci)	1.38E-01	2.04E-02	1.48E-01	1.42E-01	2.11E-02	1.49E-01	1.40E-01	2.06E-02	1.47E-01
^{240}Pu Activity (Ci)	3.28E-02	4.84E-03	1.48E-01	3.38E-02	5.00E-03	1.48E-01	3.34E-02	4.90E-03	1.47E-01
^{242}Pu Activity (Ci)	2.17E-06	3.19E-07	1.47E-01	2.23E-06	3.30E-07	1.48E-01	2.20E-06	3.23E-07	1.47E-01
^{241}Am Activity (Ci)	1.82E-02	2.69E-03	1.48E-01	1.71E-02	3.08E-03	1.80E-01	1.81E-02	3.39E-03	1.87E-01
^{90}Sr Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{137}Cs Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
TRU Alpha Conc. (nCi/g)	4.15E+05	5.94E+04	1.43E-01	4.40E+05	6.33E+04	1.44E-01	4.22E+05	6.01E+04	1.42E-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	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{234}U Activity (Ci)	1.02E-03	5.73E-05	5.62E-02	1.05E-03	5.87E-05	5.59E-02	1.02E-03	5.96E-05	5.84E-02
^{238}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}Pu Activity (Ci)	6.54E+00	9.67E-01	1.48E-01	6.70E+00	9.86E-01	1.47E-01	6.54E+00	9.61E-01	1.47E-01
^{239}Pu Activity (Ci)	1.42E-01	2.10E-02	1.48E-01	1.46E-01	2.14E-02	1.47E-01	1.42E-01	2.09E-02	1.47E-01
^{240}Pu Activity (Ci)	3.37E-02	4.99E-03	1.48E-01	3.46E-02	5.09E-03	1.47E-01	3.37E-02	4.96E-03	1.47E-01
^{242}Pu Activity (Ci)	2.22E-06	3.29E-07	1.48E-01	2.28E-06	3.35E-07	1.47E-01	2.22E-06	3.27E-07	1.47E-01
^{241}Am Activity (Ci)	1.71E-02	3.22E-03	1.88E-01	1.74E-02	3.06E-03	1.76E-01	1.69E-02	3.11E-03	1.84E-01
^{90}Sr Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{137}Cs Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
TRU Alpha Conc. (nCi/g)	4.27E+05	6.12E+04	1.43E-01	4.37E+05	6.24E+04	1.43E-01	4.26E+05	6.08E+04	1.43E-01

ATTACHMENT B.8 REPLICATE TESTING RESULTS FOR CONTAINER D52277, HENC #2 SYSTEM

Instrument: HENC#2
Container: D52277

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)	9.94E-04	5.38E-05	1.03E-03	1.87E-05	1.82E-02	4.84E-01	9.75E-01	-1.76E+00	1.54E-01
^{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)	6.37E+00	9.39E-01	6.60E+00	1.25E-01	1.89E-02	7.08E-02	9.99E-01	-1.68E+00	1.68E-01
^{239}Pu Activity (Ci)	1.38E-01	2.04E-02	1.42E-01	2.19E-03	1.54E-02	4.61E-02	1.00E+00	-1.83E+00	1.41E-01
^{240}Pu Activity (Ci)	3.28E-02	4.84E-03	3.38E-02	4.51E-04	1.33E-02	3.47E-02	1.00E+00	-2.11E+00	1.03E-01
^{242}Pu Activity (Ci)	2.17E-06	3.19E-07	2.23E-06	3.00E-08	1.35E-02	3.54E-02	1.00E+00	-1.83E+00	1.42E-01
^{241}Am Activity (Ci)	1.82E-02	2.69E-03	1.73E-02	4.71E-04	2.72E-02	1.23E-01	9.98E-01	1.70E+00	1.63E-01
^{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)	4.15E+05	5.94E+04	4.30E+05	7.70E+03	1.79E-02	6.72E-02	9.99E-01	-1.83E+00	1.42E-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)	#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.9 REPLICATE TESTING DATA FOR CONTAINER D53991, HENC #2 SYSTEM

Instrument: **HENC#2**
Container: **D53991**

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	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{234}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}Pu Activity (Ci)	8.12E-02	1.08E-03	1.33E-02	6.20E-02	8.30E-03	1.34E-01	5.51E-02	7.26E-03	1.32E-01
^{239}Pu Activity (Ci)	8.04E-01	1.07E-01	1.33E-01	7.79E-01	1.04E-01	1.34E-01	7.14E-01	9.40E-02	1.32E-01
^{240}Pu Activity (Ci)	1.58E-01	2.11E-02	1.34E-01	1.58E-01	2.12E-02	1.34E-01	1.56E-01	2.05E-02	1.31E-01
^{242}Pu Activity (Ci)	1.73E-05	2.31E-06	1.34E-01	1.51E-05	2.02E-06	1.34E-01	1.57E-05	2.06E-06	1.31E-01
^{241}Am Activity (Ci)	2.73E-01	3.63E-02	1.33E-01	2.42E-01	3.24E-02	1.34E-01	2.29E-01	3.01E-02	1.31E-01
^{90}Sr Activity (Ci)	7.34E-08	4.16E-08	5.67E-01	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{137}Cs Activity (Ci)	7.34E-08	4.16E-08	5.67E-01	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
TRU Alpha Conc. (nCi/g)	2.26E+04	1.98E+03	8.76E-02	2.13E+04	1.91E+03	8.97E-02	1.98E+04	1.73E+03	8.74E-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)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{234}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}Pu Activity (Ci)	5.60E-02	7.38E-03	1.32E-01	5.00E-02	6.64E-03	1.33E-01	3.38E-02	4.52E-03	1.34E-01
^{239}Pu Activity (Ci)	8.40E-01	1.11E-01	1.32E-01	7.90E-01	1.05E-01	1.33E-01	8.44E-01	1.13E-01	1.34E-01
^{240}Pu Activity (Ci)	1.59E-01	2.10E-02	1.32E-01	1.60E-01	2.13E-02	1.33E-01	1.61E-01	2.16E-02	1.34E-01
^{242}Pu Activity (Ci)	1.52E-05	2.00E-06	1.32E-01	1.47E-05	1.95E-06	1.33E-01	1.52E-05	2.03E-06	1.34E-01
^{241}Am Activity (Ci)	2.55E-01	3.36E-02	1.32E-01	2.26E-01	3.00E-02	1.33E-01	2.43E-01	3.25E-02	1.34E-01
^{90}Sr Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{137}Cs Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
TRU Alpha Conc. (nCi/g)	2.25E+04	2.02E+03	8.98E-02	2.10E+04	1.91E+03	9.10E-02	2.20E+04	2.05E+03	9.32E-02

ATTACHMENT B.10 REPLICATE TESTING RESULTS FOR CONTAINER D53991, HENC #2 SYSTEM

Instrument: HENC#2
Container: D53991

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)	8.12E-02	1.08E-03	5.14E-02	1.07E-02	2.08E-01	3.93E+02	7.21E-84	2.54E+00	6.39E-02
^{239}Pu Activity (Ci)	8.04E-01	1.07E-01	7.93E-01	5.30E-02	6.69E-02	9.83E-01	9.12E-01	1.82E-01	8.64E-01
^{240}Pu Activity (Ci)	1.58E-01	2.11E-02	1.59E-01	1.92E-03	1.21E-02	3.32E-02	1.00E+00	-3.80E-01	7.23E-01
^{242}Pu Activity (Ci)	1.73E-05	2.31E-06	1.52E-05	3.56E-07	2.35E-02	9.52E-02	9.99E-01	5.43E+00	5.58E-03
^{241}Am Activity (Ci)	2.73E-01	3.63E-02	2.39E-01	1.17E-02	4.91E-02	4.17E-01	9.81E-01	2.65E+00	5.72E-02
^{90}Sr Activity (Ci)	7.34E-08	4.16E-08	0.00E+00	0.00E+00	N/A	0.00E+00	1.00E+00	N/A	N/A
^{137}Cs Activity (Ci)	7.34E-08	4.16E-08	0.00E+00	0.00E+00	N/A	0.00E+00	1.00E+00	N/A	N/A
TRU Alpha Conc. (nCi/g)	2.26E+04	1.98E+03	2.13E+04	1.03E+03	4.85E-02	1.09E+00	8.96E-01	1.13E+00	3.21E-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)	Highly 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	Highly Significant
^{241}Am Activity (Ci)	Not Significant	Not Significant
^{90}Sr Activity (Ci)	Not Significant	Not Applicable
^{137}Cs Activity (Ci)	Not Significant	Not Applicable
TRU Alpha Conc. (nCi/g)	Not Significant	Not Significant

ATTACHMENT B.11 REPLICATE TESTING DATA FOR CONTAINER D55700, HENC #2 SYSTEM

Instrument: **HENC#2**
Container: **D55700**

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	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{234}U Activity (Ci)	4.10E-03	4.16E-04	1.01E-01	4.32E-03	4.20E-04	9.72E-02	4.02E-03	3.23E-04	8.03E-02
^{238}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}Pu Activity (Ci)	2.63E+01	4.26E+00	1.62E-01	2.77E+01	4.42E+00	1.60E-01	2.58E+01	4.22E-03	1.64E-04
^{239}Pu Activity (Ci)	8.06E-02	1.31E-02	1.63E-01	8.51E-02	1.36E-02	1.60E-01	7.92E-02	1.30E-02	1.64E-01
^{240}Pu Activity (Ci)	1.89E-02	3.06E-03	1.62E-01	1.99E-02	3.18E-03	1.60E-01	1.85E-02	3.04E-03	1.64E-01
^{242}Pu Activity (Ci)	6.88E-06	1.12E-06	1.63E-01	7.26E-06	1.16E-06	1.60E-01	6.76E-06	1.11E-06	1.64E-01
^{241}Am Activity (Ci)	1.82E-02	3.06E-03	1.68E-01	2.20E-02	4.58E-03	2.08E-01	2.46E-02	3.73E-03	1.52E-01
^{90}Sr Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{137}Cs Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
TRU Alpha Conc. (nCi/g)	2.96E+06	4.78E+05	1.61E-01	3.15E+06	4.96E+05	1.57E-01	2.91E+06	4.75E+05	1.63E-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	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{234}U Activity (Ci)	4.06E-03	4.16E-04	1.02E-01	4.41E-03	4.05E-04	9.18E-02	3.96E-03	4.16E-04	1.05E-01
^{238}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}Pu Activity (Ci)	2.60E+01	4.19E+00	1.61E-01	2.83E+01	4.53E+00	1.60E-01	2.54E+01	4.03E+00	1.59E-01
^{239}Pu Activity (Ci)	7.98E-02	1.29E-02	1.62E-01	8.68E-02	1.39E-02	1.60E-01	7.80E-02	1.24E-02	1.59E-01
^{240}Pu Activity (Ci)	1.87E-02	3.01E-03	1.61E-01	2.03E-02	3.26E-03	1.61E-01	1.83E-02	2.90E-03	1.58E-01
^{242}Pu Activity (Ci)	6.81E-06	1.10E-06	1.62E-01	7.41E-06	1.19E-06	1.61E-01	6.66E-06	1.06E-06	1.59E-01
^{241}Am Activity (Ci)	2.38E-02	4.53E-03	1.90E-01	1.92E-02	2.11E-03	1.10E-01	1.94E-02	2.13E-03	1.10E-01
^{90}Sr Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{137}Cs Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
TRU Alpha Conc. (nCi/g)	2.93E+06	4.70E+05	1.60E-01	3.19E+06	5.09E+05	1.60E-01	2.86E+06	4.53E+05	1.58E-01

ATTACHMENT B.12 REPLICATE TESTING RESULTS FOR CONTAINER D55700, HENC #2 SYSTEM

Instrument: HENC#2
Container: D55700

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)	4.10E-03	4.16E-04	4.15E-03	1.98E-04	4.78E-02	9.10E-01	9.23E-01	-2.48E-01	8.16E-01
^{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)	2.63E+01	4.26E+00	2.66E+01	1.28E+00	4.80E-02	3.60E-01	9.86E-01	-2.43E-01	8.20E-01
^{239}Pu Activity (Ci)	8.06E-02	1.31E-02	8.18E-02	3.91E-03	4.78E-02	3.56E-01	9.86E-01	-2.76E-01	7.96E-01
^{240}Pu Activity (Ci)	1.89E-02	3.06E-03	1.91E-02	8.99E-04	4.70E-02	3.45E-01	9.87E-01	-2.44E-01	8.19E-01
^{242}Pu Activity (Ci)	6.88E-06	1.12E-06	6.98E-06	3.33E-07	4.77E-02	3.53E-01	9.86E-01	-2.74E-01	7.97E-01
^{241}Am Activity (Ci)	1.82E-02	3.06E-03	2.18E-02	2.47E-03	1.13E-01	2.61E+00	6.26E-01	-1.33E+00	2.54E-01
^{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)	2.96E+06	4.78E+05	3.01E+06	1.51E+05	5.01E-02	3.98E-01	9.83E-01	-2.91E-01	7.86E-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)	#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.13 REPLICATE TESTING DATA FOR CONTAINER 52338, PTGS SYSTEM

Instrument: **PTGS**
Container: **52338**

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!	#DIV/0!	<LLD	#VALUE!	#DIV/0!	<LLD	#VALUE!	#DIV/0!
^{234}U Activity (Ci)	1.10E-05	2.37E-06	2.15E-01	2.06E-05	2.78E-06	1.35E-01	1.88E-05	2.61E-06	1.39E-01
^{238}U Activity (Ci)	<LLD	#VALUE!	#DIV/0!	<LLD	#VALUE!	#DIV/0!	<LLD	#VALUE!	#DIV/0!
^{238}Pu Activity (Ci)	7.07E-02	1.52E-02	2.15E-01	1.32E-01	1.78E-02	1.35E-01	1.20E-01	1.67E-02	1.39E-01
^{239}Pu Activity (Ci)	1.76E+00	2.11E-01	1.20E-01	1.73E+00	2.06E-01	1.19E-01	1.70E+00	2.04E-01	1.20E-01
^{240}Pu Activity (Ci)	4.41E-01	5.89E-02	1.34E-01	4.10E-01	5.19E-02	1.27E-01	4.03E-01	5.14E-02	1.28E-01
^{242}Pu Activity (Ci)	1.24E-05	3.45E-06	2.77E-01	1.08E-05	3.00E-06	2.78E-01	1.07E-05	2.96E-06	2.77E-01
^{241}Am Activity (Ci)	6.51E-01	7.82E-02	1.20E-01	5.73E-01	6.83E-02	1.19E-01	5.37E-01	6.44E-02	1.20E-01
^{90}Sr Activity (Ci)	2.83E-06	3.43E-07	1.21E-01	2.47E-06	2.97E-07	1.20E-01	2.54E-06	3.06E-07	1.20E-01
^{137}Cs Activity (Ci)	2.84E-06	3.44E-07	1.21E-01	2.48E-06	2.97E-07	1.20E-01	2.55E-06	3.07E-07	1.20E-01
TRU Alpha Conc. (nCi/g)	2.14E+04	1.71E+03	7.99E-02	2.08E+04	1.64E+03	7.88E-02	2.02E+04	1.61E+03	7.97E-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!	#DIV/0!	<LLD	#VALUE!	#DIV/0!	<LLD	#VALUE!	#DIV/0!
^{234}U Activity (Ci)	2.03E-05	2.76E-06	1.36E-01	2.09E-05	2.86E-06	1.37E-01	2.03E-05	2.77E-06	1.36E-01
^{238}U Activity (Ci)	<LLD	#VALUE!	#DIV/0!	<LLD	#VALUE!	#DIV/0!	<LLD	#VALUE!	#DIV/0!
^{238}Pu Activity (Ci)	1.30E-01	1.77E-02	1.36E-01	1.34E-01	1.83E-02	1.37E-01	1.30E-01	1.77E-02	1.36E-01
^{239}Pu Activity (Ci)	1.70E+00	2.02E-01	1.19E-01	1.75E+00	2.11E-01	1.21E-01	1.75E+00	2.09E-01	1.19E-01
^{240}Pu Activity (Ci)	4.36E-01	5.47E-02	1.25E-01	4.04E-01	5.17E-02	1.28E-01	4.16E-01	5.25E-02	1.26E-01
^{242}Pu Activity (Ci)	1.15E-05	3.19E-06	2.77E-01	1.04E-05	2.90E-06	2.79E-01	1.09E-05	3.01E-06	2.76E-01
^{241}Am Activity (Ci)	5.61E-01	6.67E-02	1.19E-01	5.58E-01	6.74E-02	1.21E-01	5.90E-01	7.04E-02	1.19E-01
^{90}Sr Activity (Ci)	2.56E-06	3.06E-07	1.20E-01	2.67E-06	3.24E-07	1.21E-01	2.74E-06	3.28E-07	1.20E-01
^{137}Cs Activity (Ci)	2.57E-06	3.07E-07	1.20E-01	2.68E-06	3.25E-07	1.21E-01	2.75E-06	3.29E-07	1.20E-01
TRU Alpha Conc. (nCi/g)	2.07E+04	1.61E+03	7.78E-02	2.09E+04	1.67E+03	7.99E-02	2.11E+04	1.66E+03	7.87E-02

ATTACHMENT B.14 REPLICATE TESTING RESULTS FOR CONTAINER 52338, PTGS SYSTEM

Instrument: **PTGS**
Container: **52338**

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)	1.10E-05	2.37E-06	2.02E-05	8.11E-07	4.02E-02	4.68E-01	9.77E-01	-1.03E+01	4.94E-04
^{238}U Activity (Ci)	<LLD	#VALUE!	N/A	N/A	N/A	N/A	N/A	N/A	N/A
^{238}Pu Activity (Ci)	7.07E-02	1.52E-02	1.29E-01	5.40E-03	4.18E-02	5.06E-01	9.73E-01	-9.88E+00	5.88E-04
^{239}Pu Activity (Ci)	1.76E+00	2.11E-01	1.73E+00	2.51E-02	1.45E-02	5.66E-02	1.00E+00	1.24E+00	2.84E-01
^{240}Pu Activity (Ci)	4.41E-01	5.89E-02	4.14E-01	1.35E-02	3.25E-02	2.09E-01	9.95E-01	1.84E+00	1.39E-01
^{242}Pu Activity (Ci)	1.24E-05	3.45E-06	1.09E-05	4.04E-07	3.72E-02	5.49E-02	1.00E+00	3.55E+00	2.38E-02
^{241}Am Activity (Ci)	6.51E-01	7.82E-02	5.64E-01	1.96E-02	3.47E-02	2.50E-01	9.93E-01	4.07E+00	1.52E-02
^{90}Sr Activity (Ci)	2.83E-06	3.43E-07	2.60E-06	1.08E-07	4.15E-02	3.95E-01	9.83E-01	1.98E+00	1.19E-01
^{137}Cs Activity (Ci)	2.84E-06	3.44E-07	2.61E-06	1.08E-07	4.14E-02	3.93E-01	9.83E-01	1.98E+00	1.19E-01
TRU Alpha Conc. (nCi/g)	2.14E+04	1.71E+03	2.07E+04	3.36E+02	1.62E-02	1.55E-01	9.97E-01	1.79E+00	1.48E-01

Quantity of Interest	χ^2 Test	t Test
^{233}U Activity (Ci)	Not Applicable	Not Applicable
^{234}U Activity (Ci)	Not Significant	Highly Significant
^{238}U Activity (Ci)	Not Applicable	Not Applicable
^{238}Pu Activity (Ci)	Not Significant	Highly Significant
^{239}Pu Activity (Ci)	Not Significant	Not Significant
^{240}Pu Activity (Ci)	Not Significant	Not Significant
^{242}Pu Activity (Ci)	Not Significant	Significant
^{241}Am Activity (Ci)	Not Significant	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.15 REPLICATE TESTING DATA FOR CONTAINER 53551, PTGS SYSTEM

Instrument: **PTGS**
Container: **53551**

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!	#DIV/0!	<LLD	#VALUE!	#DIV/0!	<LLD	#VALUE!	#DIV/0!
^{234}U Activity (Ci)	2.45E-05	3.51E-06	1.43E-01	1.98E-05	2.89E-06	1.46E-01	2.56E-05	3.57E-06	1.39E-01
^{238}U Activity (Ci)	<LLD	#VALUE!	#DIV/0!	<LLD	#VALUE!	#DIV/0!	<LLD	#VALUE!	#DIV/0!
^{238}Pu Activity (Ci)	1.57E-01	2.25E-02	1.43E-01	1.27E-01	1.85E-02	1.46E-01	1.64E-01	2.29E-02	1.40E-01
^{239}Pu Activity (Ci)	5.83E+00	6.92E-01	1.19E-01	4.99E+00	5.95E-01	1.19E-01	5.13E+00	6.16E-01	1.20E-01
^{240}Pu Activity (Ci)	1.31E+00	1.59E-01	1.21E-01	1.13E+00	1.37E-01	1.21E-01	1.14E+00	1.39E-01	1.22E-01
^{242}Pu Activity (Ci)	3.08E-05	8.52E-06	2.77E-01	2.64E-05	7.32E-06	2.77E-01	2.59E-05	7.17E-06	2.77E-01
^{241}Am Activity (Ci)	3.98E+00	4.73E-01	1.19E-01	3.25E+00	3.87E-01	1.19E-01	3.40E+00	4.09E-01	1.20E-01
^{90}Sr Activity (Ci)	7.13E-07	8.96E-08	1.26E-01	4.48E-07	5.82E-08	1.30E-01	3.90E-07	5.22E-08	1.34E-01
^{137}Cs Activity (Ci)	7.15E-07	8.98E-08	1.26E-01	4.49E-07	5.84E-08	1.30E-01	3.91E-07	5.24E-08	1.34E-01
TRU Alpha Conc. (nCi/g)	2.86E+05	2.16E+04	7.55E-02	2.41E+05	1.84E+04	7.63E-02	2.50E+05	1.91E+04	7.64E-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!	#DIV/0!	<LLD	#VALUE!	#DIV/0!	<LLD	#VALUE!	#DIV/0!
^{234}U Activity (Ci)	2.64E-05	3.59E-06	1.36E-01	2.08E-05	3.03E-06	1.46E-01	2.26E-05	3.23E-06	1.43E-01
^{238}U Activity (Ci)	<LLD	#VALUE!	#DIV/0!	<LLD	#VALUE!	#DIV/0!	<LLD	#VALUE!	#DIV/0!
^{238}Pu Activity (Ci)	1.70E-01	2.30E-02	1.35E-01	1.33E-01	1.94E-02	1.46E-01	1.45E-01	2.07E-02	1.43E-01
^{239}Pu Activity (Ci)	5.15E+00	6.15E-01	1.19E-01	5.16E+00	6.15E-01	1.19E-01	5.33E+00	6.32E-01	1.19E-01
^{240}Pu Activity (Ci)	1.11E+00	1.36E-01	1.23E-01	1.15E+00	1.40E-01	1.22E-01	1.13E+00	1.36E-01	1.20E-01
^{242}Pu Activity (Ci)	2.58E-05	7.14E-06	2.77E-01	2.67E-05	7.38E-06	2.76E-01	2.60E-05	7.19E-06	2.77E-01
^{241}Am Activity (Ci)	3.35E+00	4.01E-01	1.20E-01	3.29E+00	9.32E-01	2.83E-01	3.45E+00	4.10E-01	1.19E-01
^{90}Sr Activity (Ci)	2.75E-07	3.92E-08	1.43E-01	4.08E-07	5.39E-08	1.32E-01	6.00E-07	7.59E-08	1.27E-01
^{137}Cs Activity (Ci)	2.76E-07	3.93E-08	1.42E-01	4.09E-07	5.41E-08	1.32E-01	6.02E-07	7.61E-08	1.26E-01
TRU Alpha Conc. (nCi/g)	2.48E+05	1.90E+04	7.66E-02	2.47E+05	1.89E+04	7.65E-02	2.55E+05	1.94E+04	7.61E-02

ATTACHMENT B.16 REPLICATE TESTING RESULTS FOR CONTAINER 53551, PTGS SYSTEM

Instrument: **PTGS**
Container: **53551**

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)	2.45E-05	3.51E-06	2.30E-05	2.90E-06	1.26E-01	2.72E+00	6.05E-01	4.60E-01	6.69E-01
^{238}U Activity (Ci)	<LLD	#VALUE!	N/A	N/A	N/A	N/A	N/A	N/A	N/A
^{238}Pu Activity (Ci)	1.57E-01	2.25E-02	1.48E-01	1.88E-02	1.27E-01	2.79E+00	5.93E-01	4.47E-01	6.78E-01
^{239}Pu Activity (Ci)	5.83E+00	6.92E-01	5.15E+00	1.21E-01	2.35E-02	1.22E-01	9.98E-01	5.12E+00	6.89E-03
^{240}Pu Activity (Ci)	1.31E+00	1.59E-01	1.13E+00	1.48E-02	1.31E-02	3.48E-02	1.00E+00	1.10E+01	3.94E-04
^{242}Pu Activity (Ci)	3.08E-05	8.52E-06	2.62E-05	3.78E-07	1.45E-02	7.88E-03	1.00E+00	1.12E+01	3.62E-04
^{241}Am Activity (Ci)	3.98E+00	4.73E-01	3.35E+00	8.07E-02	2.41E-02	1.17E-01	9.98E-01	7.15E+00	2.03E-03
^{90}Sr Activity (Ci)	7.13E-07	8.96E-08	4.24E-07	1.17E-07	2.77E-01	6.87E+00	1.43E-01	2.24E+00	8.81E-02
^{137}Cs Activity (Ci)	7.15E-07	8.98E-08	4.25E-07	1.18E-07	2.77E-01	6.88E+00	1.42E-01	2.24E+00	8.82E-02
TRU Alpha Conc. (nCi/g)	2.86E+05	2.16E+04	2.48E+05	5.07E+03	2.04E-02	2.20E-01	9.94E-01	6.81E+00	2.43E-03

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

ATTACHMENT B.17 REPLICATE TESTING DATA FOR CONTAINER 54857, PTGS SYSTEM

Instrument: **PTGS**
Container: **54857**

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!	#DIV/0!	<LLD	#VALUE!	#DIV/0!	<LLD	#VALUE!	#DIV/0!
^{234}U Activity (Ci)	3.27E-05	4.54E-06	1.39E-01	2.24E-05	3.29E-06	1.47E-01	2.26E-05	3.27E-06	1.45E-01
^{238}U Activity (Ci)	<LLD	#VALUE!	#DIV/0!	<LLD	#VALUE!	#DIV/0!	<LLD	#VALUE!	#DIV/0!
^{238}Pu Activity (Ci)	2.10E-01	2.91E-02	1.39E-01	1.44E-01	2.11E-02	1.47E-01	1.45E-01	2.09E-02	1.44E-01
^{239}Pu Activity (Ci)	4.82E+00	5.78E-01	1.20E-01	4.00E+00	4.74E-01	1.19E-01	4.02E+00	4.79E-01	1.19E-01
^{240}Pu Activity (Ci)	1.18E+00	1.45E-01	1.23E-01	9.96E-01	1.21E-01	1.21E-01	9.38E-01	1.15E-01	1.23E-01
^{242}Pu Activity (Ci)	2.98E-05	8.26E-06	2.77E-01	2.46E-05	6.80E-06	2.76E-01	2.30E-05	6.38E-06	2.77E-01
^{241}Am Activity (Ci)	1.89E+00	2.27E-01	1.20E-01	1.79E+00	2.13E-01	1.19E-01	1.78E+00	2.12E-01	1.19E-01
^{90}Sr Activity (Ci)	2.37E-07	3.22E-08	1.36E-01	2.44E-07	3.19E-08	1.31E-01	1.90E-07	2.62E-08	1.38E-01
^{137}Cs Activity (Ci)	2.38E-07	3.23E-08	1.36E-01	2.45E-07	3.20E-08	1.31E-01	1.90E-07	2.62E-08	1.38E-01
TRU Alpha Conc. (nCi/g)	4.11E+05	3.24E+04	7.88E-02	3.52E+05	2.71E+04	7.70E-02	3.49E+05	2.72E+04	7.79E-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!	#DIV/0!	<LLD	#VALUE!	#DIV/0!	<LLD	#VALUE!	#DIV/0!
^{234}U Activity (Ci)	2.22E-05	3.22E-06	1.45E-01	2.41E-05	3.42E-06	1.42E-01	2.55E-05	3.49E-06	1.37E-01
^{238}U Activity (Ci)	<LLD	#VALUE!	#DIV/0!	<LLD	#VALUE!	#DIV/0!	<LLD	#VALUE!	#DIV/0!
^{238}Pu Activity (Ci)	1.42E-01	2.06E-02	1.45E-01	1.54E-01	2.19E-02	1.42E-01	1.63E-01	2.24E-02	1.37E-01
^{239}Pu Activity (Ci)	4.02E+00	4.80E-01	1.19E-01	3.99E+00	4.75E-01	1.19E-01	4.06E+00	4.78E-01	1.18E-01
^{240}Pu Activity (Ci)	9.78E-01	1.20E-01	1.23E-01	9.21E-01	1.13E-01	1.23E-01	1.01E+00	1.23E-01	1.22E-01
^{242}Pu Activity (Ci)	2.41E-05	6.69E-06	2.78E-01	2.25E-05	6.22E-06	2.76E-01	2.50E-05	6.92E-06	2.77E-01
^{241}Am Activity (Ci)	1.77E+00	2.12E-01	1.20E-01	1.75E+00	2.09E-01	1.19E-01	1.77E+00	2.08E-01	1.18E-01
^{90}Sr Activity (Ci)	2.96E-07	3.82E-08	1.29E-01	2.50E-07	3.28E-08	1.31E-01	1.59E-07	2.29E-08	1.44E-01
^{137}Cs Activity (Ci)	2.97E-07	3.83E-08	1.29E-01	2.51E-07	3.29E-08	1.31E-01	1.60E-07	2.29E-08	1.43E-01
TRU Alpha Conc. (nCi/g)	3.51E+05	2.74E+04	7.81E-02	3.46E+05	2.70E+04	7.80E-02	3.55E+05	2.72E+04	7.66E-02

ATTACHMENT B.18 REPLICATE TESTING RESULTS FOR CONTAINER 54857, PTGS SYSTEM

Instrument: **PTGS**
Container: **54857**

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)	3.27E-05	4.54E-06	2.34E-05	1.41E-06	6.04E-02	3.87E-01	9.84E-01	6.04E+00	3.79E-03
^{238}U Activity (Ci)	<LLD	#VALUE!	N/A	N/A	N/A	N/A	N/A	N/A	N/A
^{238}Pu Activity (Ci)	2.10E-01	2.91E-02	1.50E-01	8.79E-03	5.88E-02	3.65E-01	9.85E-01	6.27E+00	3.30E-03
^{239}Pu Activity (Ci)	4.82E+00	5.78E-01	4.02E+00	2.68E-02	6.68E-03	8.62E-03	1.00E+00	2.73E+01	1.07E-05
^{240}Pu Activity (Ci)	1.18E+00	1.45E-01	9.69E-01	3.79E-02	3.92E-02	2.74E-01	9.91E-01	5.09E+00	7.04E-03
^{242}Pu Activity (Ci)	2.98E-05	8.26E-06	2.38E-05	1.06E-06	4.45E-02	6.58E-02	9.99E-01	5.13E+00	6.82E-03
^{241}Am Activity (Ci)	1.89E+00	2.27E-01	1.77E+00	1.48E-02	8.37E-03	1.71E-02	1.00E+00	7.26E+00	1.91E-03
^{90}Sr Activity (Ci)	2.37E-07	3.22E-08	2.28E-07	5.38E-08	2.36E-01	1.12E+01	2.48E-02	1.56E-01	8.83E-01
^{137}Cs Activity (Ci)	2.38E-07	3.23E-08	2.29E-07	5.40E-08	2.36E-01	1.12E+01	2.48E-02	1.59E-01	8.81E-01
TRU Alpha Conc. (nCi/g)	4.11E+05	3.24E+04	3.51E+05	3.36E+03	9.59E-03	4.31E-02	1.00E+00	1.64E+01	8.09E-05

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

ATTACHMENT B.19 REPLICATE TESTING DATA FOR CONTAINER S817309, HENC #2 SYSTEM

Instrument: **HENC#2**
Container: **S817309**

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	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{234}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}Pu Activity (Ci)	9.31E-03	2.10E-05	2.26E-03	1.96E-02	2.61E-04	1.33E-02	1.32E-02	1.47E-04	1.11E-02
^{239}Pu Activity (Ci)	1.53E-01	5.54E-03	3.62E-02	1.52E-01	5.47E-03	3.60E-02	1.51E-01	5.47E-03	3.62E-02
^{240}Pu Activity (Ci)	3.78E-02	6.69E-04	1.77E-02	3.32E-02	3.30E-04	9.95E-03	3.71E-02	3.97E-04	1.07E-02
^{242}Pu Activity (Ci)	5.16E-06	6.45E-12	1.25E-06	9.30E-06	3.73E-11	4.01E-06	8.48E-06	3.56E-11	4.20E-06
^{241}Am Activity (Ci)	1.53E-02	6.01E-05	3.93E-03	4.16E-02	5.12E-04	1.23E-02	4.67E-02	6.21E-04	1.33E-02
^{90}Sr Activity (Ci)	2.44E-05	1.41E-10	5.77E-06	2.39E-05	1.35E-10	5.66E-06	2.24E-05	1.19E-10	5.30E-06
^{137}Cs Activity (Ci)	2.44E-05	1.41E-10	5.77E-06	2.39E-05	1.35E-10	5.66E-06	2.24E-05	1.19E-10	5.30E-06
TRU Alpha Conc. (nCi/g)	1.30E+03	3.19E+05	2.45E+02	1.48E+03	3.70E+05	2.50E+02	1.50E+03	3.75E+05	2.50E+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)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{234}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}Pu Activity (Ci)	1.68E-02	2.18E-04	1.30E-02	2.56E-02	4.17E-04	1.63E-02	2.34E-02	3.21E-04	1.37E-02
^{239}Pu Activity (Ci)	1.51E-01	5.42E-03	3.59E-02	1.54E-01	5.62E-03	3.65E-02	1.48E-01	5.21E-03	3.52E-02
^{240}Pu Activity (Ci)	3.18E-02	3.13E-04	9.85E-03	3.24E-02	3.07E-04	9.46E-03	2.98E-02	2.76E-04	9.26E-03
^{242}Pu Activity (Ci)	8.40E-06	3.42E-11	4.07E-06	1.03E-05	4.32E-11	4.19E-06	9.40E-06	3.42E-11	3.64E-06
^{241}Am Activity (Ci)	3.01E-02	2.98E-04	9.91E-03	3.83E-02	6.51E-04	1.70E-02	5.94E-02	9.62E-04	1.62E-02
^{90}Sr Activity (Ci)	2.26E-05	1.21E-10	5.35E-06	2.27E-05	1.22E-10	5.37E-06	2.23E-05	1.18E-10	5.28E-06
^{137}Cs Activity (Ci)	2.26E-05	1.21E-10	5.35E-06	2.27E-05	1.22E-10	5.37E-06	2.23E-05	1.18E-10	5.28E-06
TRU Alpha Conc. (nCi/g)	1.39E+03	3.41E+05	2.45E+02	1.51E+03	4.05E+05	2.68E+02	1.57E+03	3.99E+05	2.54E+02

ATTACHMENT B.20 REPLICATE TESTING RESULTS FOR CONTAINER S817309, HENC #2 SYSTEM

Instrument: HENC#2
Container: S817309

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)	9.31E-03	2.10E-05	1.97E-02	4.98E-03	2.52E-01	2.24E+05	0.00E+00	-1.91E+00	1.29E-01
^{239}Pu Activity (Ci)	1.53E-01	5.54E-03	1.51E-01	2.17E-03	1.43E-02	6.13E-01	9.62E-01	7.58E-01	4.91E-01
^{240}Pu Activity (Ci)	3.78E-02	6.69E-04	3.29E-02	2.68E-03	8.16E-02	6.43E+01	3.58E-13	1.68E+00	1.68E-01
^{242}Pu Activity (Ci)	5.16E-06	6.45E-12	9.18E-06	7.77E-07	8.47E-02	5.81E+10	0.00E+00	-4.72E+00	9.19E-03
^{241}Am Activity (Ci)	1.53E-02	6.01E-05	4.32E-02	1.09E-02	2.52E-01	1.31E+05	0.00E+00	-2.34E+00	7.90E-02
^{90}Sr Activity (Ci)	2.44E-05	1.41E-10	2.28E-05	6.46E-07	2.83E-02	8.42E+07	0.00E+00	2.29E+00	8.38E-02
^{137}Cs Activity (Ci)	2.44E-05	1.41E-10	2.28E-05	6.46E-07	2.83E-02	8.42E+07	0.00E+00	2.29E+00	8.38E-02
TRU Alpha Conc. (nCi/g)	1.30E+03	3.19E+05	1.49E+03	6.52E+01	4.38E-02	1.68E-07	1.00E+00	-2.66E+00	5.64E-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)	Highly Significant	Not Significant
^{239}Pu Activity (Ci)	Not Significant	Not Significant
^{240}Pu Activity (Ci)	Highly Significant	Not Significant
^{242}Pu Activity (Ci)	Highly Significant	Highly Significant
^{241}Am Activity (Ci)	Highly Significant	Not Significant
^{90}Sr Activity (Ci)	Highly Significant	Not Significant
^{137}Cs Activity (Ci)	Highly Significant	Not Significant
TRU Alpha Conc. (nCi/g)	Not Significant	Not Significant

ATTACHMENT B.21 REPLICATE TESTING DATA FOR CONTAINER 61209, HENC #2 SYSTEM

Instrument: **HENC #2**
Container: **61209**

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	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{234}U Activity (Ci)	1.17E-05	2.41E-11	2.06E-06	1.17E-05	1.85E-11	1.58E-06	1.20E-05	2.40E-11	2.00E-06
^{238}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}Pu Activity (Ci)	1.21E-03	3.05E-07	2.52E-04	2.48E-04	1.59E-08	6.40E-05	1.10E-03	2.48E-07	2.25E-04
^{239}Pu Activity (Ci)	8.59E-03	1.34E-05	1.56E-03	8.61E-03	1.67E-05	1.94E-03	8.63E-03	1.08E-05	1.25E-03
^{240}Pu Activity (Ci)	2.52E-03	1.42E-06	5.62E-04	2.06E-03	1.09E-06	5.30E-04	1.90E-03	8.25E-07	4.34E-04
^{242}Pu Activity (Ci)	1.87E-07	7.61E-15	4.07E-08	1.18E-07	3.60E-15	3.05E-08	1.64E-07	5.76E-15	3.51E-08
^{241}Am Activity (Ci)	8.17E-04	1.54E-07	1.89E-04	1.04E-03	2.71E-07	2.61E-04	2.35E-03	1.14E-06	4.83E-04
^{90}Sr Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{137}Cs Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
TRU Alpha Conc. (nCi/g)	2.39E+02	7.34E+03	3.07E+01	2.40E+02	8.30E+03	3.46E+01	2.55E+02	7.75E+03	3.04E+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	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{234}U Activity (Ci)	1.23E-05	2.48E-11	2.02E-06	8.33E-06	1.42E-11	1.71E-06	1.02E-05	1.83E-11	1.79E-06
^{238}U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{238}Pu Activity (Ci)	1.92E-03	8.03E-07	4.18E-04	1.04E-03	2.25E-07	2.16E-04	2.01E-03	8.64E-07	4.30E-04
^{239}Pu Activity (Ci)	8.44E-03	1.38E-05	1.63E-03	8.45E-03	1.29E-05	1.53E-03	8.48E-03	1.35E-05	1.59E-03
^{240}Pu Activity (Ci)	2.11E-03	1.06E-06	5.01E-04	2.36E-03	1.25E-06	5.29E-04	2.44E-03	1.36E-06	5.58E-04
^{242}Pu Activity (Ci)	1.83E-07	7.58E-15	4.14E-08	1.58E-07	5.50E-15	3.48E-08	1.99E-07	8.78E-15	4.41E-08
^{241}Am Activity (Ci)	1.04E-03	2.51E-07	2.41E-04	8.93E-04	1.81E-07	2.03E-04	1.02E-03	2.39E-07	2.34E-04
^{90}Sr Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
^{137}Cs Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	0.00E+00
TRU Alpha Conc. (nCi/g)	2.46E+02	7.95E+03	3.23E+01	2.32E+02	6.96E+03	3.00E+01	2.54E+02	8.13E+03	3.20E+01

ATTACHMENT B.22 REPLICATE TESTING RESULTS FOR CONTAINER 61209, HENC #2 SYSTEM

Instrument: HENC#2
Container: 61209

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)	1.17E-05	2.41E-11	1.09E-05	1.65E-06	1.51E-01	1.88E+10	0.00E+00	4.39E-01	6.83E-01
^{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)	1.21E-03	3.05E-07	1.26E-03	7.24E-04	5.73E-01	2.25E+07	0.00E+00	-6.76E-02	9.49E-01
^{239}Pu Activity (Ci)	8.59E-03	1.34E-05	8.52E-03	9.09E-05	1.07E-02	1.84E+02	9.26E-39	6.83E-01	5.32E-01
^{240}Pu Activity (Ci)	2.52E-03	1.42E-06	2.17E-03	2.22E-04	1.02E-01	9.85E+04	0.00E+00	1.42E+00	2.28E-01
^{242}Pu Activity (Ci)	1.87E-07	7.61E-15	1.64E-07	3.06E-08	1.86E-01	6.45E+13	0.00E+00	6.75E-01	5.37E-01
^{241}Am Activity (Ci)	8.17E-04	1.54E-07	1.27E-03	6.08E-04	4.79E-01	6.19E+07	0.00E+00	-6.78E-01	5.35E-01
^{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)	2.39E+02	7.34E+03	2.45E+02	9.69E+00	3.95E-02	6.97E-06	1.00E+00	-6.03E-01	5.79E-01

Quantity of Interest	χ^2 Test	t Test
^{233}U Activity (Ci)	#VALUE!	Not Applicable
^{234}U Activity (Ci)	Highly Significant	Not Significant
^{238}U Activity (Ci)	#VALUE!	Not Applicable
^{238}Pu Activity (Ci)	Highly Significant	Not Significant
^{239}Pu Activity (Ci)	Highly Significant	Not Significant
^{240}Pu Activity (Ci)	Highly Significant	Not Significant
^{242}Pu Activity (Ci)	Highly Significant	Not Significant
^{241}Am Activity (Ci)	Highly 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

Attachments C.1 through C.8

ATTACHMENT C.1
EPA INSPECTION ISSUE TRACKING FORM, ISSUE NO. LANL-CCP-AK-06-001CR
Upon further analysis, the EPA issue presented here may be included in the EPA Inspection Report as an EPA Finding or Concern and can be the basis for EPA approval/disapproval

Inspection No. EPA-LANL-CCP-05.06-8	**Issue Number:** LANL-CCP-AK-06-001CR **Date:** 05-23-06
Inspector: Connie Walker **Attachments?** ☐ YES ☒ NO	**Sample Size:** All waste streams **Population size (if known):** All waste streams

A. Description of Issue: EPA Checklist Elements 38, 42, and 48 are related to the reassessment of waste if the AK data and related confirmation consistently indicate discrepancies between acceptable knowledge information and measurement data. Up to this point, CCP has not formally re-evaluated waste streams for which NDA data and AK-identified most prevalent nuclides do not comport because only a portion of the waste stream had been measured. However, CCP should develop processes and criteria to establish when reassessment would occur and what this would entail.

B. Regulatory Reference: Attachment B4, Section B4-4; DOE-WIPP-02-3122, Attachment A, Section A.2.2.3

C. Site Requirement(s): CCP-TP-005, Revision 16

D. Discussed with: Site Personnel: Steve Schafer, Randy Fitzgerald
DOE/CTAC Personnel: Norm Frank
Other Personnel: NA

E. Additional Comments: CCP should provide the path or process by which the above evaluation will be accomplished in the future. EPA shall evaluate the implementation of the process through periodic updates.

The potential for this concern to impact waste characterization activities at all CCP TRU waste characterization sites must be evaluated. Once the evaluation is complete, EPA must be informed of the results of CCP's investigation.

F. Site Response Information and Issue Resolution:

Site Response Required? ☒YES ☐ NO
Site Response Due Date: 6-18-06

The formal CBFO response that was submitted to EPA on March 21, 2007 is provided below:

> In accordance with the requirements of CCP-QP-005, *CCP TRU Nonconforming Item Reporting and Control* and CCP-TP-005, *CCP Acceptable Knowledge Documentation*, CCP has implemented Trend Code L for identifying NCRs that potentially impact AK. NCRs that identify inconsistencies noted

Inspection No. EPA-LANL-CCP-05.06-8	**Issue Number:** LANL-CCP-AK-06-001CR **Date:** 05-23-06

during the process of comparing AK information to characterization results and NCRs that identify potential changes to the AK of a waste stream are tracked as Trend Code L. These NCRs are evaluated by the AKE. The AKE evaluation and resolution of the NCR may include preparation of an AK Discrepancy Resolution report, an AK Re-Evaluation, and/or an update to the applicable AK report. Final disposition of Trend Code L NCRs is dependent upon the AKE?s evaluation and conclusions regarding actions necessary to close the NCR.

Trending of NCRs identified as Trend Code L is performed and reported in the CCP Trend Report, which is prepared semi-annually in accordance with CCP-QP-014, *CCP Data Analysis and Trending*. If Trend Code L NCRs indicate consistent discrepancies between AK and measurement data, a re-evaluation of AK information will be conducted. CCP does not anticipate any re-evaluation of an entire approved waste stream. If an approved waste stream is eliminated or combined with another approved waste steam, a memorandum written to the AK record will be prepared in accordance to CCP-TP-005, Section 4.3.3, to document the issues, evaluations, and conclusions regarding the waste stream reassignment. In the event an entire waste stream is eliminated or combined with an existing approved waste stream in the future, CCP will provide and document training to characterization personnel regarding changes to the delineation of the waste stream and the content of the memorandum written to the AK record.

EPA accepts CBFO’s response and considers this issue to be closed.

ATTACHMENT C.2
EPA INSPECTION ISSUE TRACKING FORM, ISSUE NO. LANL-CCP-AK-06-002C

Upon further analysis, the EPA issue presented here may be included in the EPA Inspection Report as an EPA Finding or Concern and can be the basis for EPA approval/disapproval

Inspection No. EPA-LANL-CCP-05.06-8	**Issue Number:** LANL-CCP-AK-06-002C **Date:** 5-23-06
Inspector: Connie Walker **Attachments?** ☐ YES ☒ NO	**Sample Size:** All waste stream AK Accuracy Reports **Population size (if known):** see above

A. Description of Issue: AK Accuracy for radionuclides is determined by comparing the AK and NDA-identified weight percents of the two predominant radionuclides. However, this assessment would be more meaningful if accuracy was also assessed in terms of *activity*. For example, the March 27, 2006 AK Accuracy Report for Waste Stream LA-MIN03-NC.001 states that the most prevalent isotopes identified by AK are ^{235}U and ^{235}U, based on weight percent. However, the assignment of ^{238}U and ^{235}U as the most prevalent is based on the radionuclide content of a small number of containers. If these containers are not among those that are measured, the measured versus AK predicted prevalence by mass would not match. Future AK Accuracy reports should also assess the AK-NDA agreement in identifying the two most prevalent radionuclides by activity as well as mass.

B. Regulatory Reference: 40 CFR 194.24 (c)(3), CH WAC Appendix A section A.2

C. Site Requirement(s): CCP-TP-005, Revision 16, Section 4.5

D. Discussed with: Site Personnel: Steve Schafer, Randy Fitzgerald
DOE/CTAC Personnel: Norm Frank
Other Personnel: NA

E. Additional Comments: The potential for this concern to impact waste characterization activities at all CCP TRU waste characterization sites must be evaluated. Once the evaluation is complete, EPA must be informed of the result of CCP's investigation.

F. Site Response Information and Issue Resolution: EPA considers this issue to be closed.

Site Response Required? ☐ YES ☒ NO
Site Response Due Date: N/A

ATTACHMENT C.3
EPA INSPECTION ISSUE TRACKING FORM, ISSUE NO. LANL-CCP-AK-06-003CR

Upon further analysis, the EPA issue presented here may be included in the EPA Inspection Report as an EPA Finding or Concern and can be the basis for EPA approval/disapproval

Inspection No. EPA-LANL-CCP-05.06-8	**Issue Number:** LANL-CCP-AK-06-003CR **Date:** 10-31-05
Inspector: Connie Walker **Attachments?** ☐ YES ☒ NO	**Sample Size:** AK- NDA Memoranda **Population size (if known):** Three (3)

A. Description of Issue: The AK-NDA memoranda have various inconsistencies that should be addressed. The LANL-004 NDA-AK memorandum includes editorial issues with respect to appropriate units and inadequate referencing of support documents for specific statements or conclusions. In the NDA memoranda for LANL-007 and 009, references for formulas or other calculations should be included. Tables in all NDA-AK memoranda should be checked against data in the AK Summaries and Attachments to ensure that the data presented therein are consistent; specifically, Table 3 in the LANL-009 AK-NDA memorandum should be revised to indicated expected (rather than suspected) radionuclides as this makes a difference in how the nuclides are entered into the WWIS.

B. Regulatory Reference: 40 CFR 194.24 (c),

C. Site Requirement(s): CCP-TP-005 Revision 16, Section 4.4.20

D. Discussed with: Site Personnel: Steve Schafer, Randy Fitzgerald
DOE/CTAC Personnel: Norm Frank
Other Personnel: NA

E. Additional Comments:

F. Site Response Information and Issue Resolution:

Site Response Required? ☒ YES ☐ NO
Site Response Due Date: 6-18-06

The *NDA* Memorandum is LANL-CCP's method of addressing EPA-identified communication issues and originated when EPA identified these issues at a Hanford-CCP inspection. Some remedies implemented by sites related to TRU WC processes in response to EPA issues or concerns are self imposed, however, these at times may in fact provide assurance that EPA's issues and/or concerns are appropriately identified and rectified. When such AK-NDA memoranda are written they document AK-NDA communication for the purpose of ensuring that both NDA and AK personnel are aware of the use and limitations of AK as applied to NDA. CBFO has stated that, as with any process of improvement, inconsistencies should be corrected when they are found, and LANL-CCP has revised NDA memoranda for waste streams LANL-004, LANL-007 and LANL-009 to address the issues that were identified. EPA is convinced that when AK NDA communication occurs through the process of using an AK-NDA memorandum it avoids problems that could ultimately result in erroneous data use. EPA accepts the CBFO response and considers this issue to be closed.

ATTACHMENT C.4
EPA INSPECTION ISSUE TRACKING FORM, ISSUE NO. LANL-CCP-VE-06-004F

Upon further analysis, the EPA issue presented here may be included in the EPA Inspection Report as an EPA Finding or Concern and can be the basis for EPA approval/disapproval

Inspection No. EPA-LANL-CCP-05.06-8	**Issue Number:** LANL-CCP-VE-06-004F, Revision 1 **Date:** 5/23/06
Inspector: Dorothy E. Gill **Attachments?** ☐ YES ☒ NO	**Sample Size:** Approximately 350 containers **Population size (if known):** NA

Description of Issue:

A. The quantity and location of prohibited liquid encountered in the RTR examinations of containers prior to May 2005 from waste stream number LA-MIN03-NC.001 were not predicted in the AK summary CCP-AK-LANL-004. Although characterization personnel initiated NCRs to address the presence of prohibited liquids, this information was not communicated to AK personnel to enable updating of the AK record. As a result, more than 120 drums of waste with the potential to contain in excess of 1% liquids (the maximum allowable on a per drum basis) were emplaced in the WIPP over the past 12 months.

B. CCP personnel used VE in Lieu of RTR to characterize wastes from this same waste stream from May 4 through June 23, 2005. However, the presence of liquids made the use of this technique unsuitable for containers of S3000 wastes. Until corrective action is taken the use of this technique at CCP sites is unacceptable.

B. Regulatory Reference: 40 CFR 194.24 (c)

C. Site Requirement(s): CCP-TP-113, Revision 4

D. Discussed with: Site Personnel: Buddy Fussell, Sue Peterman
DOE/CTAC Personnel: Annabelle Axinn, Wayne Ledford
Other Personnel: NA

E. Additional Comments: The potential for this finding to impact waste characterization activities at all CCP TRU waste characterization sites must be evaluated. Once this is evaluated, EPA must be informed of the result of CCP's investigation. EPA will perform its own investigation during inspections at other CCP sites to make its own determination of the extent of this finding's scope. DOE must also evaluate the impact of these approximately 120 drums that may contain liquid on the containment of TRU waste at WIPP.

F. Site Response Information and Issue Resolution:
Site Response Required? ☒ YES ☐ NO
Site Response Due Date: 6/18/06

CBFO Interpreted this finding as a prohibition of the use of VE for all solid (S3000) waste streams throughout the DOE complex. This was not EPA's intention and EPA provided verbal clarification to CBFO regarding this on multiple occasions. EPA did intend this finding to prohibit the use VE for de-watered sludge containers at LANL-CCP and to prompt CBFO to reexamine the use of VE for similar wastes throughout the complex. The formal CBFO response that was submitted to EPA on March 21, 2007 is provided below:

> CCP will conduct additional training to the SPMs and AKEs to develop and issue, as necessary, a memorandum to be included in the AK record to document special characterization requirements for S3000/S4000 summary category group wastes. This is primarily to document the technical basis for the decision to use VE in lieu of RTR.

EPA accepts the CBFO response and considers this issue to be closed.

ATTACHMENT C.5
EPA INSPECTION ISSUE TRACKING FORM, ISSUE NO. LANL-CCP-VE-06-005CR

Upon further analysis, the EPA issue presented here may be included in the EPA Inspection Report as an EPA Finding or Concern and can be the basis for EPA approval/disapproval

Inspection No. EPA-LANL-CCP-05.06-8	**Issue Number:** LANL-CCP-VE-06-005CR **Date:** 5/24/06
Inspector: Dorothy E. Gill **Attachments?** ☐ YES ☒ NO	**Sample Size:** 5 VE & RTR personnel **Population size (if known):** NA

A. Description of Issue: Attachments used for data entry for both RTR and VE include a line item that requires operators to verify that the waste examined matches the Waste Stream description. The VEE for the VE demonstration and the operators of RTR units 1 and 2, observed by EPA on 5/24/06, could not explain how they were able to answer this question. These personnel did not have a copy of Waste Stream descriptions, for example CCP-LANL-AK-9, in their respective work areas nor were they able to describe the items included in the Waste Stream descriptions provided in the AK Summary Report for the waste stream they were currently examining.

B. Regulatory Reference: 40 CFR 194.24 (c)

C. Site Requirement(s):

1. CCP-TP-113, Revision 4, Standard Waste Visual Examination, Attachment 1, Question #32
2. CCP-TP-053, Revision 4, Standard Real-Time Radiography (RTR) Inspection Procedure, Attachment 2, Section 5.

D. Discussed with: Site Personnel: Steven Ewing, Bill Mussman, Colleen Monk, Israel Aragon, Ricky Baros
DOE/CTAC Personnel: Annabelle Axinn
Other Personnel: NA

E. Additional Comments: The potential for this concern to impact waste characterization activities at all CCP TRU waste characterization sites must be evaluated. Once this is evaluated, EPA must be informed of the result of CCP's investigation.

F. Site Response Information and Issue Resolution:

Site Response Required? ☒ YES ☐ NO
Site Response Due Date: 6-18-06

Prior to the March 6, 2007 follow-up inspection EPA reviewed a copy of the LANL-CCP RTR and VE Training Module (PowerPoint presentation) and the Non Destructive Examination (NDE) RTR Comprehensive Examination. During the March 2007 follow-up inspection, EPA interviewed RTR operators who were able to correctly answer questions with the regard to the items on the data form that are detailed above. The operators also demonstrated to EPA that they had access to both paper and electronic copies of the applicable AK waste stream descriptions. EPA considers this issue to be closed.

ATTACHMENT C.6
EPA INSPECTION ISSUE TRACKING FORM, ISSUE NO. LANL-CCP-VE-06-006CR

Upon further analysis, the EPA issue presented here may be included in the EPA Inspection Report as an EPA Finding or Concern and can be the basis for EPA approval/disapproval

Inspection No. EPA-LANL-CCP-05.06-8	**Issue Number:** LANL-CCP-VE-06-006CR **Date:** 05-25-06
Inspector: Dorothy Gill **Attachments?** ☐ YES ☒ NO	**Sample Size:** All containers reviewed **Population size (if known):** Unknown

A. Description of Issue:

1. Waste Material Parameter weights are inconsistently recorded for leaded rubber gloves. In RTR, leaded gloves are recorded as only under the rubber waste material parameter but in VE the weight of the gloves is assigned in the following way: 60% rubber and 40% other metals.
2. VE personnel were unable to provide the rationale for assigning the weights (60:40) in this manner.

B. Regulatory Reference: 40 CFR 194.24 (c)

C. Site requirement(s):

1. CCP-TP-113, Revision 4, Standard Waste Visual Examination, Attachment 1, section 3
2. CCP-TP-053, Revision 4, Standard Real-Time Radiography (RTR) Inspection Procedure, Attachment 2, section 4

D. Discussed with: Site Personnel: Steve Ewing, Israel Aragon, Buddy Fussell
DOE/CTAC Personnel: Annabelle Axinn
Other Personnel: NA

E. Additional Comments: The potential for this concern to impact waste characterization activities at all CCP TRU waste characterization sites must be evaluated. Once the evaluation is complete, EPA must be informed of the results of CCP's investigation.

F. Site Response Information and Issue Resolution:

Site Response Required? ☒YES ☐ NO
Site Response Due Date: 6-18-06

CBFO's response that was submitted to EPA is provided below:

> CCP VPM and SPM gave verbal directions to stop this practice and provided training on June 22, 2006. CCP will assign the weight of leaded rubber gloves as 100% rubber.

EPA accepts the CBFO response and considers this issue to be closed.

ATTACHMENT C.7
EPA INSPECTION ISSUE TRACKING FORM, ISSUE NO. LANL-CCP-VE-06-007CR

Upon further analysis, the EPA issue presented here may be included in the EPA Inspection Report as an EPA Finding or Concern and can be the basis for EPA approval/disapproval

Inspection No. EPA-LANL-CCP-05.06-8	**Issue Number:** LANL-CCP-VE-06-007CR **Date:** 5-25-06
Inspector: Dorothy Gill **Attachments?** ☐ YES ☒ NO	**Sample Size:** 5 Batch Data Reports (BDRs) **Population size (if known):** 5 BDRs

A. Description of Issue: The containers examined by VE in BDR LAVE500061 (VE as a QC Check of RTR) contained numerous small cans that were opened but not empty during the VE event. CCP personnel were unable to demonstrate that all of the WMPs contained in the cans were inventoried and the VE procedure does not address this circumstance.

B. Regulatory Reference: 40 CFR 194.24 (c)

C. Site requirement(s): CCP-TP-113, Revision 4, Standard Waste Visual Examination.

D. Discussed with: Site Personnel: Israel Aragon, Sue Peterman
DOE/CTAC Personnel: Annabelle Axinn
Other Personnel: NA

E. Additional Comments: The potential for this concern to impact waste characterization activities at all CCP TRU waste characterization sites must be evaluated. Once the evaluation is complete, EPA must be informed of the result of CCP's investigation.

F. Site Response Information and Issue Resolution:
Site Response Required? ☒ YES ☐ NO
Site Response Due Date: 6/18/06

The CBFO response that was submitted to EPA is provided below:

> CCP will conduct additional training to the VE operators/VE experts to verbalize more during VE operations that would allow an independent person to reach the same conclusion as the VE operator or VE expert.

EPA accepts the CBFO response and considers this issue to be closed.

ATTACHMENT C.8
EPA INSPECTION ISSUE TRACKING FORM, ISSUE NO. LANL-CCP-RTR-06-008C

Upon further analysis, the EPA issue presented here may be included in the EPA Inspection Report as an EPA Finding or Concern and can be the basis for EPA approval/disapproval

Inspection No. EPA-LANL-CCP-05.06-8	**Issue Number:** LANL-CCP-RTR-06-008C **Date:** 5-25-06
Inspector: Dorothy Gill **Attachments?** ☐ YES ☒ NO	**Sample Size:** 2 **Population size (if known):** 2

A. Description of Issue: CCP at LANL has generated two (2) annual VE/RTR Comparison Reports but at the time of this inspection RTR operators had not received any "lessons learned" training on the discrepancies between the RTR and VE results.

B. Regulatory Reference: 40 CFR 194.24 (c)

C. Site requirement(s): QAPD Revision 7, Section 1.1.1.4

D. Discussed with: Site Personnel: Steve Ewing, Buddy Fussell
DOE/CTAC Personnel: Annabelle Axinn
Other Personnel: NA

E. Additional Comments: None

F. Site Response Information and Issue Resolution: EPA considers this issue to be closed.

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