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WASTE CHARACTERIZATION INSPECTION REPORT AND APPROVAL

**EPA BASELINE INSPECTION NO. EPA-ORNL-CCP-CH-11.07-8
OF THE CENTRAL CHARACTERIZATION PROJECT
WASTE CHARACTERIZATION PROGRAM
AT THE OAK RIDGE NATIONAL LABORATORY**

November 13–15, 2007

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

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ACRONYMS

ABS	absorber
ABSMOD	absorber/moderator
AK	acceptable knowledge
AKE	Acceptable Knowledge Expert
AKSR	AK summary report
Am	americium
BDR	batch data report
CBFO	Carlsbad Area Field Office
CCP	Central Characterization Project
Cf	californium
CFR	<i>Code of Federal Regulations</i>
CH	contact-handled
CHMB	Contact-Handled Marshalling Building
CHSA	Contact-Handled Container Storage Area
Cs	cesium
CTAC	Carlsbad Technical Assistance Contractor
CTS	Characterization Tracking System
D&D	decontamination and decommissioning
DAC	drum aging criteria
DOE	U.S. Department of Energy
DRR	discrepancy resolution report
DU	depleted uranium
Dupont/SRO	E.I. du Pont de Nemours/Savannah River Operations
DVRF	Decontamination and Volume Reduction Facility
DWAS	Drum Waste Assay System
DWAS IPAN/SGS	Drum Waste Assay System Imaging Passive-Active Neutron/Segmented Gamma Scanner
EA	expert analyst
EM	environmental management
EPA	U.S. Environmental Protection Agency
ES&H	environmental safety and health

Eu	europium
FGE	fissile gram equivalent
FR	<i>Federal Register</i>
FRAM	fixed energy response function analysis with multiple efficiencies
FWHM	full-width-at-half-maximum
g	gram or grams
g/cm ³	grams per cubic centimeter
IPAN	Imaging Passive Active Neutron
ITR	Independent Technical Reviewer
kg	kilogram or kilograms
LANL	Los Alamos National Laboratory
LEGe	low-energy germanium
LLD	lower limit of detection
LLW	low-level waste
MCS	Mobile Characterization Services
Mev	mega electron volt
MGA	multi-group analysis
MOD	moderator
MOX	mixed oxide
N/A	not applicable
nCi/g	nanocuries per gram
NCR	nonconformance report
NDA	nondestructive assay
NDE	nondestructive examination
NFS	Nuclear Fuel Services, Inc.
Np	neptunium
ORIA	Office of Radiation and Indoor Air
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
OSR	off-site source recovery
PDP	Performance Demonstration Program
PTS	Program Tracking System
Pu	plutonium

QC	quality control
RCRA	Resource Conservation and Recovery Act
RCTS	radiation control technical supervisor
RTR	real-time radiography
SEFOR	Southwest Experimental Fast Oxide Reactor
SGS	Segmented Gamma Scanner
SPM	Site Project Manager
Sr	strontium
SRS	Savannah River Site
SWB	standard waste box
T1	Tier 1
T2	Tier 2
Th	thorium
TMU	total measurement uncertainty
TRU	transuranic
TRUPACT	transuranic packaging transporter
TWCP	TRU Waste Processing Center
U	uranium
VAGAS	Versatile Automated Gamma Assay System
VE	visual examination
VPM	vendor project manager
WAC	waste acceptance criteria
WAP	Waste Analysis Plan
WEAF	Waste Examination and Assay Facility
WC	waste characterization
WCA	Waste Certification Assistant
WCO	Waste Certification Official
WG Pu	weapons-grade plutonium
WIPP	Waste Isolation Pilot Plant
WMC	waste matrix code
WMP	waste material parameter
WSPF	Waste Stream Profile Form
WTS	Washington TRU Solutions

WWIS

WIPP Waste Information System

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. EPA-ORNL-CCP-CH-11.07-8 of the Central Characterization Project (CCP) waste characterization (WC) program for contact-handled (CH) transuranic (TRU) wastes at the U.S. Department of Energy (DOE) Oak Ridge National Laboratory (ORNL) in Oak Ridge, Tennessee. This inspection occurred at the TRU Project Processing Center located on the Oak Ridge Reservation (ORR) in Oak Ridge, Tennessee, November 13 through 15, 2007. In accordance with the provisions of 40 CFR 194.8(b), as issued in a July 16, 2004, *Federal Register* (FR) notice (69 FR 42571–42583), EPA conducted a baseline inspection of the site's program to characterize wastes proposed for disposal at the Waste Isolation Pilot Plant (WIPP). As a result of this baseline inspection, EPA is proposing to approve the ORNL-CCP CH TRU WC program based on a demonstration of the CCP's capabilities to characterize retrievably-stored contact-handled (CH) transuranic (TRU) debris waste from ORNL, with the conditions and limitations that are discussed in this report, in accordance with 40 CFR 194.8(b). Upon finalization of this approval ORNL's CH TRU debris waste may be disposed of at the Waste Isolation Pilot Plant (WIPP).

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 TRU radioactive waste (63 FR 27354, 27405, May 18, 1998). EPA had not previously evaluated WC systems at ORNL-CCP for characterizing TRU wastes. The purpose of this inspection was to evaluate the adequacy of the site's WC programs for CH TRU debris waste to be disposed of at the WIPP. During the inspections, the Agency examined the following activities:

- Acceptable knowledge (AK) for CH retrievably-stored TRU debris waste (S5000)
- One nondestructive assay (NDA) system, the Drum Waste Assay System Imaging Passive-Active Neutron/Segmented Gamma Scanner (DWAS IPAN/SGS) system for characterizing debris (S5000) wastes
- Real-time radiography (RTR) for CH retrievably-stored TRU debris waste (S5000)
- WIPP Waste Information System (WWIS) for CH retrievably-stored TRU debris waste (S5000)

During the inspection, ORNL-CCP personnel stated that the ORNL-CCP is not seeking approval to perform load management, and EPA excluded evaluation of load management from the scope of this inspection [see Section 8.1(5)]. Therefore, this approval does not include load management for ORNL-CCP.

The EPA inspection team identified eight concerns, six of which required a response and two that did not require a response. EPA Inspection Issue Tracking Forms (see Attachments C.1, C.2 and C.4 through C.9 to this report) document these concerns. Personnel from ORNL-CCP and CBFO provided information to resolve the other eight concerns to the EPA inspection team prior to the closeout of the onsite inspection and after the inspection. The information provided to EPA adequately addressed the concerns. The EPA inspection team also identified one finding

(ORNL-CCP-CH-CBFO-003F, Final, see Attachment C.3 to this report) that was directed specifically to the DOE Carlsbad Area Field Office (CBFO). This report does not discuss the finding; however, CBFO, in a letter dated December 21, 2007, provided a commitment to EPA to prevent recurrence of the issues covered in the finding. EPA considers the one finding and the eight concerns related to ORNL-CCP to be resolved, and there are no open issues resulting from this inspection.

The EPA inspection team determined that the ORNL-CCP WC program for retrievably-stored CH TRU debris waste was technically adequate. EPA, therefore, is proposing to approve the ORNL-CCP CH TRU WC program in the configuration observed during this inspection and described in this report and the attached checklists (Attachments A.1 through A.4). This approval includes the following:

- (1) The AK process for CH retrievably-stored TRU debris wastes
- (2) The DWAS IPAN/SGS system for assaying CH TRU wastes
- (3) The nondestructive examination (NDE) process of RTR for CH TRU debris wastes
- (4) The WWIS process for tracking waste contents of CH TRU wastes

ORNL-CCP must report and receive EPA approval of any Tier 1 (T1) changes to the ORNL-CCP WC activities from the date of the baseline inspection, and must notify EPA regarding Tier 2 (T2) changes according to Table 1, below. Table 1 in this report closely follows the format used in previous CH baseline approval reports.

Footnote b in Tables 1 and 8 specifies that “substantive changes” are changes with the potential to impact the site’s WC activities under 40 CFR 194.24 or the documentation thereof, excluding changes that are solely related to environmental safety and health (ES&H), nuclear safety, or the Resource Conservation and Recovery Act (RCRA) or that are editorial in nature.

All T1 changes must be submitted for evaluation and approval by EPA prior to implementation (see Section 2.0 of this report for a brief discussion of tiering). Upon approval, EPA will notify the public of the results of its evaluations by posting the results to the EPA Web site and by sending e-mails the WIPPNEWS list. 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 ORNL-CCP’s T2 changes at the end of the first quarter following approval.

The scope of the site baseline compliance decision is based on EPA’s inspection completed on November 13–15, 2007.

**Table 1. Tiering of TRU WC Processes Implemented by ORNL
Based on November 13–15, 2007, Site Baseline Inspection**

WC Process Elements	ORNL-CCP WC T1 Changes	ORNL-CCP WC T2 Changes ^a
Acceptable Knowledge (AK) and Load Management	<p>Implementation of load management; AK (5)</p> <p>Implementation of AK for wastes other than retrievably-stored debris (i.e., retrievably stored soil/gravel and solids and/or any type of newly-generated waste); AK (15)</p>	<p>Notification to EPA upon completion of AK accuracy reports; AK (2)</p> <p>Notification to EPA upon completion of new versions or updates/substantive changes^b of the following:</p> <ul style="list-style-type: none"> - Changes to AK-NDA communications and memoranda; AK (3) - Changes to site procedure; AK (4) - AK summaries that describe wastes beyond the 144 containers described in this report; AK (6) - Radiological Discrepancy Resolution Reports (AK-AK and AK-NDA) pertinent to Waste Stream OR-NFS-CH-HET; AK (11) - Completed Attachments 4 and 6 and associated memoranda for Waste Stream OR-NFS-CH-HET; AK (10) and (14) - AK Summaries/Waste Stream Profile Forms (WSPFs) and AK documentation reports; AK (15)
Non Destructive Assay (NDA)	<p>New equipment or physical modifications to approved equipment^c; NDA (1)</p> <p>Extension or changes to approved calibration range for approved equipment; NDA (2)</p>	<p>Notification to EPA upon completion of changes to software for approved equipment, operating range(s), and site procedures that require CBFO approval; NDA (2)</p>
Real-Time Radiography (RTR)	N/A	<p>Notification to EPA upon the following:</p> <ul style="list-style-type: none"> - Implementation of new RTR equipment or substantive changes^c to approved RTR equipment; RTR (1) - Completion of changes to site RTR procedures requiring CBFO approvals; RTR (2)
Visual Examination (VE)	Not approved at this time	Not approved at this time
WIPP Waste Information System (WWIS)	Implementation of load management; WWIS (4)	<p>Notification to EPA upon the following:</p> <ul style="list-style-type: none"> - Completion of changes to WWIS procedure(s) requiring CBFO approvals; WWIS (1)

^aUpon receiving EPA approval, ORNL-CCP will report all T2 changes to EPA at the end of each fiscal quarter.

^b“Substantive changes” are changes with the potential to impact the site’s WC activities or documentation thereof, excluding changes that are solely related to ES&H, nuclear safety, or RCRA, or that are editorial in nature.

^cModifications 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, EPA certified that the 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 DOE to (1) provide EPA with information on AK¹ 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 194.24 (c)(4), which states the following:

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

In other words, the purpose of the baseline inspection is to assess whether DOE sites that characterize TRU waste prior to disposal at the WIPP are capable of characterizing and tracking the waste in such a manner that EPA is confident that the waste will not exceed the approved limits. Before proposing the approval of WC systems and processes at ORNL-CCP, EPA evaluated the capabilities of systems and processes to (1) identify and measure waste

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

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

components (such as plutonium) that must be tracked for compliance,³ and (2) confirm that the waste in any given container has been properly identified as belonging to the group of approved waste streams.

Following EPA's approval of the WC processes evaluated during the baseline inspection, EPA is authorized to evaluate and approve, if necessary, changes to the site's approved WC program by conducting additional inspections under the authority of 40 CFR 194.24(h). Under 40 CFR 194.24, EPA has the authority to conduct continued compliance inspections to verify that the site continues to use only the approved WC processes to characterize the waste and remains in compliance with all regulatory requirements. Based on the adequacies of the WC processes demonstrated during the baseline inspection, including all conditions and limitations, EPA will specify which subsequent WC program changes or modifications must undergo further EPA inspection or approval under 40 CFR 194.24. EPA will accomplish this by assigning a tier level to each aspect of the characterization program. T1 activities have more stringent reporting requirements and require DOE to notify EPA and receive the Agency's approval prior to implementing the change. DOE will report T2 activities to EPA based on the frequency established in the inspection report. DOE may choose to characterize and dispose of materials at its own risk while EPA considers the proposed T2 changes. If ORNL-CCP contemplates a change that is not identified in this report, EPA recommends that the site, in consultation with 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 (69 FR 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. ORNL-CCP-CH-11.07-8 in terms of findings and concerns. Specifically, this report does the following:

- Describes the characterization systems evaluated during the inspection that are approved
- 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, as applicable
- Describes any tests or demonstrations completed during the course of the inspection and their relevance to EPA's approval decision

³ The potential contents of a waste stream or group of waste streams determine which processes can adequately characterize the waste. For example, if AK information suggests that the waste form is heterogeneous, the site should select a suitable NDA technique to ensure adequate measurements. Radiography and VE help to confirm and quantify waste components, such as celluloses, 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.4 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 Area Field Office
P.O. Box 3090
Carlsbad, NM 88221

EPA's final approval decision on the ORNL-CCP WC program will be 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. EPA-ORNL-CCP-11.07-8 was the evaluation of the technical adequacy of the WC systems in use at ORNL-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 RTR for CH retrievably-stored debris waste
- Perform effective waste information (data) transfer using the WWIS

Specifically, these systems consisted of the following components:

- AK processes that support retrievably-stored S5000 debris wastes
- One NDA system, the DWAS IPAN/SGS system, for the analysis of S5000 debris wastes
- RTR
- The WWIS for the purpose of data transfer for all waste containers destined for WIPP emplacement

During an inspection, EPA does not approve characterization data; that function is the sole responsibility of the site being evaluated—in this case, ORNL-CCP. EPA evaluated the site's WC processes to characterize CH retrievably-stored TRU debris wastes. The evaluation consisted of interviewing personnel, observing equipment operations that follow 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, RTR tapes, 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 inspection techniques. Based on the evaluation of the WC processes in conjunction with the sample of objective evidence, EPA determined the technical adequacy of the WC processes within the inspection’s scope.

5.0 INSPECTION-RELATED DEFINITIONS

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

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

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

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

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
Lloyd Generette	EPA Observer	U.S. EPA Region 4
Michael Eagle	Quality Assurance Auditor	U.S. EPA ORIA
Connie Walker	Inspector	S. Cohen & Associates, Inc.
Aris Papadopolous	Inspector	S. Cohen & Associates, Inc
Dorothy Gill	Inspector	S. Cohen & Associates, Inc.
Colin Falato	Inspector	S. Cohen & Associates, Inc
Patrick Kelly	Inspector	S. Cohen & Associates, Inc.

6.2 Personnel Contacted

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

Table 3. Personnel Contacted During Inspection

Personnel	Affiliation	Area of Expertise/Function
Jeff Harrison	CCP—Tech Specs	AK-AKE
David Larson	WTS	AK-AKE
David Adkins	WTS	AK-AKE
Dick Blauvelt	CTAC	AK
Norman Frank	CTAC	NDA—DWAS IPAN/SGS
John West	MCS	NDA—DWAS IPAN/SGS
Joe Wachter	MCS	NDA—DWAS IPAN/SGS
Sean Stanfield	MCS	NDA—DWAS IPAN/SGS
Barry Smith	MCS	NDA—DWAS IPAN/SGS
George Westik	MCS	NDA—DWAS IPAN/SGS
Christa Chavez	CCP-WTS	NDA—DWAS IPAN/SGS
Joseph Harvill	CCP-WTS	NDA—DWAS IPAN/SGS
Susan Smith	MCS NDE	Operator/ITR
E. Lee Smith	MCS NDE	Operator/ITR
David Larson	CCP	WCA/WCO
Bob Billet	VPM	Container Management
Courtland Fesmire	CBFO	TRU Waste Certification Work Coordinator

During the baseline inspection, ORNL-CCP provided a list of TRU WC personnel, from which EPA selected a sample of individuals to interview. 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 those ORNL-CCP WC personnel responsible for characterizing and certifying TRU waste were qualified and had received adequate training to perform their assigned function. When personnel changes occur, EPA may request qualification and training records of any new individuals identified as key WC personnel. EPA will review these records and may interview the personnel to determine their ability to produce quality data. This personnel qualification evaluation and review of training records is similar to EPA’s evaluation during each inspection.

7.0 PERFORMANCE OF THE INSPECTION

7.1 Site Background and History

ORNL is one of the three main complexes located on the 35,299-acre DOE ORR, approximately 8 miles southwest of the residential areas of Oak Ridge, Tennessee. ORNL encompasses 8,771 acres and is bounded by the Clinch River on its eastern, southern, and western borders. First established in 1943 as part of the Manhattan Project to pioneer a method for producing and separating plutonium, ORNL’s later activities focused on research and development of nuclear research reactors, particle accelerators, hot cells, and engineering process development facilities. ORNL’s current mission includes environmental restoration and nuclear material stabilization

and stewardship. The TRU Waste Processing Center (TWCP), located 2 miles east of ORNL on the ORR, is the site of all WC activities evaluated during this inspection.

7.2 Inspection Process Overview

EPA Baseline Inspection No. ORNL-CCP-11.07-8 took place November 13–15, 2007. EPA reviewed additional documents that were provided after the inspection to complete its evaluation of several of the technical areas within the inspection’s scope. The inspection was performed for the purpose of determining ORNL-CCP WC program 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) Obtaining and reviewing site procedures, reports, and other technical information related to WC activities at ORNL-CCP in advance of the inspection
- (3) Interacting with CBFO and ORNL-CCP personnel to arrange inspection logistics
- (4) 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
- (5) Recording all concerns on EPA Inspection Issue Tracking Forms and providing completed forms to CBFO and site personnel as they were generated
- (6) Communicating all pertinent information to CBFO and ORNL-CCP personnel onsite, as appropriate
- (7) Pursuing resolution of all identified issues before completion of the inspection by discussions with CBFO and ORNL-CCP personnel
- (8) Conducting entrance, exit, and daily briefings for CBFO and ORNL-CCP management personnel, as appropriate
- (9) Reviewing additional information provided by ORNL-CCP after the inspection

8.0 TECHNICAL WASTE CHARACTERIZATION AREAS

Sections 8.1 through 8.5 of this report detail the five technical areas assessed during this inspection—AK and load management; NDA; NDE, consisting of RTR; the WWIS; and container management.

8.1 Acceptable Knowledge

EPA examined the AK process and associated information to determine whether ORNL-CCP demonstrated compliance with 40 CFR 194.8 requirements for CH retrievably-stored debris waste.

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 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 report preparation
- Reassignment of waste stream due to AK and discrepancy analysis
- AK accuracy

Attachment A.1 to this report identifies objective evidence reviewed by the EPA inspection team. AK provides information on several aspects of TRU wastes at ORNL-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 a variety of documents related to AK, provided in paper and/or electronic format. The list of all documents reviewed as objective evidence is presented below. The number preceding each document reference (e.g., C100, I052, M012, P284) represents the identifier within the ORNL-CCP numbering system that is used for AK documentation. Please note that some of these documents are considered proprietary information for Nuclear Fuel Services, Inc. (NFS), of Erwin, Tennessee, and these documents may not be released to the general public. In the list below these documents are marked **NFS Proprietary, Not Approved for Public Release**.

- CCP-PO-001, CCP Transuranic Waste Characterization Quality Assurance Project Plan, Revision 15, August 10, 2007
- CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19, May 22, 2007

- CCP-PO-002, CCP Transuranic Waste Characterization Plan, Revision 20, Draft M
- CCP-AK-ORNL-001, CCP Acceptable Knowledge Summary Report for Nuclear Fuel Services Contact-Handled Transuranic Waste Stored at Oak Ridge National Laboratory. Waste Stream: OR-NFS-CH-HET, Revision 0, September 25, 2007, Revision 1, November 30, 2007
- CCP-TP-005, CCP Acceptable Knowledge Documentation, Revision 18, with sample attachments, November, 16, 2006
- CCP-TP-005, Attachment 1, Acceptable Knowledge Documentation Checklist, Revision 18, October 30, 2007
- CCP-TP-005, Attachment 4, Acceptable Knowledge Source Document Reference List (Included in AK Summary Report: CCP-AK-ORNL-001), November 14, 2007, and November 30, 2007
- CCP-TP-005, Attachment 5, Hazardous Constituents, Revision 18, October 26, 2007
- CCP-TP-005, Attachment 6, Waste Form, Waste Material Parameters, Prohibited Items, and Packaging, Revision 18, October 26, 2007
- CCP-TP-005, Attachment 6, Memorandum from Jeff Harrison, CCP AKE, to Records, Waste Material Parameter Analysis for Waste Stream OR-NFS-CH-HET, NFS Contact-Handled Transuranic Waste Stored at Oak Ridge National Laboratory, Revision 0, September 25, 2007
- CCP-TP-005, Attachment 7, Radionuclides (Radiological Characterization or NDA Memo), Revision 0, October 26, 2007; Revision 1, January 7, 2008
- CCP-TP-005, Attachment 8, Waste Containers List, Revision 18, October 26, 2007
- CCP-TP-005, Attachment 9, Waste Characterization Data Cross-Reference, Example Form, undated
- CCP-TP-005, Attachment 10, Acceptable Knowledge Re-Evaluation Checklist, Example Form, undated
- ORNL-AK Tracking Spreadsheet, printed November 15, 2007
- CCP-QP-002, CCP Training and Qualification Plan, Revision 25, May 8, 2007
- Draft Waste Stream Profile Form for Waste Stream OR-NFS-CH-HET and Characterization Information, for audit purposes only, November 2007
- CCR-TP-001, CCP Project Level Data Validation and Verification, Revision 17, September 24, 2007
- Qualification Card for Jeff Harrison, provided November 15, 2007
- Qualification Card for David Adkins, provided November 15, 2007
- CCP Internal Surveillance Report (draft cover letter only), provided November 14, 2007
- C099, Letter to Harold Johnson, CBFO DOE, re: KAPL-NFS Transuranic Waste Background Information, May 3, 2005

- C100, Interview with Richard Booth and Faxed defense and waste information for NFS, Erwin, TN TRU waste, February 4, 2005—**NFS Proprietary, Not Approved for Public Release**
- C119, Removal of Contaminated Pipe, Building 234 Area B, Memorandum to Ron Mitchell, Letter of Authorization, LOA-7000-018, March 20, 2002—**NFS Proprietary, Not Approved for Public Release**
- C121, DVRF Bale Packaging Glovebox Removal, Memorandum to Ron Mitchell, LOA-7000-034, February 15, 2001—**NFS Proprietary, Not Approved for Public Release**
- C122, Building 234 Characterization Results, Memorandum to Heather Little, DCM-03-18, 44T-99-0436, GPC-99-013, September 30, 1999—**NFS Proprietary, Not Approved for Public Release**
- C127, Size Reduction of the NDA Station 2 Glovebox in the DVRF Decontamination Cell, Memorandum to Ron Mitchell and Rick Leitner, SWI-02-018, April 16, 2001—**NFS Proprietary, Not Approved for Public Release**
- C129, Size Reduction Process Ductwork within the Decontamination Cell, DVRF, Memorandum to Ron Mitchell and Rick Leitner, SWI-01-015, March 15, 2001—**NFS Proprietary, Not Approved for Public Release**
- C130, Cleanout of DVRF Bale Packaging Glovebox, Memorandum to Ron Mitchell and Rick Leitner, SWI-01-013, March 3, 2001—**NFS Proprietary, Not Approved for Public Release**
- DR001, CCP-TP-005, Attachment 11, Acceptable Knowledge Source Document Discrepancy Resolution (Radionuclide Determination), September 21, 2007; November 1, 2007
- DR002, CCP-TP-005, Attachment 11, Acceptable Knowledge Source Document Discrepancy Resolution (EPA Hazardous Waste Number Assignment), Revision 0, September 21, 2007; Revision 1, November 1, 2007
- I052, Memorandum; Building 234 Shear Baler Characterization Samples, DC-03-18, 44T-02-0633, GPC-02-013, September 11, 2002
- I056, Removal of Building 234 Wet Cell Permacon Containment Enclosure, DC-SWI-03-041, June 20, 2002—**NFS Proprietary, Not Approved for Public Release**
- I058, Dismantlement of the West Wet Cell Wall in Building 234, DC-SWI-02-030, undated—**NFS Proprietary, Not Approved for Public Release**
- I059, Waste Packaging of Wet Cell Wall in Building 234, WST-SWI-02-002, Revision 1, September 19, 2002—**NFS Proprietary, Not Approved for Public Release**
- I061, Size Reduction of the DVRS Glovebox, DC-SWI-01-020, May 24, 2001—**NFS Proprietary, Not Approved for Public Release**
- I067, Procedure for the Operation of the Versatile Automated Gamma Assay System (VAGAS), NFS-ACC-104, Revision 0, May 8, 2000—**NFS Proprietary, Not Approved for Public Release**

- I068, Size Reduction of 4-inch Diameter Duct Section in Area C, DC-SWI-02-004, Revision 0, January 25, 2002—**NFS Proprietary, Not Approved for Public Release**
- M007, Finding of No Significant Impact, Receipt and Storage at Oak Ridge National Laboratory of Transuranic Waste, Mixed Transuranic Waste, and Mixed Oxide Waste from Nuclear Fuel Services, Inc., Letter No. ER-NEPA/92-05, November 9, 1996
- M011, Material Safety Data Sheets for Products Used at NFS, undated
- M012, Environmental Management (EM) Waste Database Query, August 9, 2007
- M013, EM Waste Database Query—NFS Box Daughter and Repack Drums, August 23 and 29, 2007
- M016, Incoming Container Travelers for NFS Waste, various dates
- M017, Foster Wheeler NDA Data for NFS TRU Waste, various dates
- M018, Foster Wheeler NDE Data for NFS TRU Waste, various dates
- M019, Foster Wheeler VE Data for NFS TRU Waste, various dates
- M021, Defense Determination Approval Form, Waste Stream ORNL/NFS-HD-001, May 13, 2005
- P212, Lattice Experiments with Simulated Burned-Up Fuel for D₂O Power Reactors, DP-1122, February 1968—**NFS Proprietary, Not Approved for Public Release**
- P251, Box Breakdown Area Operations, CH-P-OP-003, Revision 7, March 13, 2007
- P254, Contact Handled Waste Repackaging, CH-P-OP-013, Revision 6, April 30, 2007
- P255, Contact Handled Waste Acceptance Criteria, T-CH-FW-X-AD-001, Revision 5, October 19, 2006
- P256, TRU/Alpha Low Level Waste (LLW) Treatment Project Documented Safety Analysis, T-CM-FW-R-AD-001, Revision 13, October 16, 1992
- P268, ORNL WAC for Contact Handled Transuranic and Mixed Oxide Wastes from Nuclear Fuel Services, Inc., WMRA-WMPC-106, October 16, 1992
- P272, Oak Ridge National Laboratory Waste Management Plan, ORNL/TM-11433, Revision 1, December 1991; Revision 2, 1992; and Revision 3, 1993
- P273, Nuclear Fuel Services, Inc., Waste Certification Plan for Transuranic Waste, 28G-91-001, Revision 0, July 1991; DCM-03-05, Revision 0, July 1991; Revision 1, February 1992
- U016, A Graphical Workbook for Estimating Important Quantities of NFS Radioactive Waste Constituents, March 1, 1992
- U017, The Inter-Comparison of NDA Measurements on CH-TRU Waste Between Nuclear Fuel Services, Inc., and Oak Ridge National Laboratory, October 24, 1995
- U040, NFS Response to “Transuranic Waste Baseline Inventory Report Questionnaire,” January 1996

- P284, Gunnink, R., MGA: A Gamma-Ray Spectrum Analysis Code for Determining Plutonium Isotopic Abundances, Volume 1, Methods and Algorithms, UCRL-LR-103220, Lawrence Livermore National Laboratory, April 3, 1990
- P285, Voss, J., T., Los Alamos Radiation Monitoring Notebook, LA-UR-00-2584, June 2000, updated February 2001

Table 4 shows the BDRs that the EPA inspection team examined during this inspection.

Table 4. BDRs Examined

Container Number	RTR BDR Number	NDA BDR Number
X10C0501112	OR-RTR6-0002	OR-DWAS-0001
X10C0505990	OR-RTR6-0006	OR-DWAS-0002
X10C0501382	OR-RTR6-0007	No data available
X10C0501270	OR-RTR6-0007	OR-DWAS-0002

Technical Evaluation

The EPA inspection team evaluated a single retrievably-stored debris waste stream, identified as OR-NFS-CH-HET. This is the only waste stream with containers that had undergone complete characterization at ORNL-CCP, and samples from it were selected for evaluation during the inspection. This waste stream consists of CH TRU mixed heterogeneous debris wastes that were generated at NFS from 2000 through 2003 as a result of the Building 234 decontamination and decommissioning (D&D) and that have been stored at ORNL. EPA evaluated the adequacy of AK pertaining only to these CH TRU retrievably-stored debris wastes, as described below. Accordingly, the addition of newly-generated wastes is a T1 change, as discussed in Section (16), below. (See Table 1, which includes this as a T1 change.)

(1) Data management was evaluated and found to be adequate.

ORNL-CCP uses two primary databases to document AK and characterization information, the Program Tracking System (PTS) and the AK Tracking Spreadsheet. AK procedure CCP-TP-005, *CCP Acceptable Knowledge Documentation*, requires development and maintenance of the AK Tracking Spreadsheet that lists containers within each waste stream as well as container identification, waste stream identification, generation date, vent date/status and changes, and container type. The PTS tracks the characterization status of each container, and the Characterization Tracking System module (CTS) of the PTS tracks nonconformances on a container basis. ORNL-CCP representatives indicated that drums that are subject to a nonconformance report (NCR) are identified by a hold tag that is physically attached to the drum to identify problematic containers. ORNL-CCP representatives indicated that ORNL also has a site EM database that tracks both historic and current characterization information for containers. ORNL-CCP personnel said while they might use the EM database for information, they are not responsible for input to or maintenance of this database.

It should be noted that ORNL-CCP tracks each container's characterization status, while Energx⁴ is responsible for container movement and storage locations. According to the AK Summary Report (AKSR), approximately four areas may be used to manage containers: Storage Areas 7883, 7880, 7879, and 7574. Mr. Bob Billett, the CCP-ORNL Program Manager, clarified that the Contact-Handled Storage Area (CHSA) near the TWPC has additional container storage that Energx also uses to stage characterized containers. A new Contact-Handled [waste] Marshalling Building (CHMB), currently under construction, will be used to stage TRU containers and to load transuranic packaging transporters (TRUPACTs). ORNL-CCP representatives stated that Energx performs an inventory of the TRU waste stream population on a weekly basis, emphasizing that drum location and management are top-priority items to ensure that TRUPACT payloads include only those containers with appropriate characterization.

(2) AK accuracy was assessed and found to be adequate.

Attachment 14 of CCP-TP-005 documents the annual AK accuracy assessment. Because the ORNL-CCP characterization process had only been performed for a few months at the time of EPA's inspection, an AK accuracy report was not available for review during the inspection. However, EPA received an AK accuracy report during the week of December 4, 2007, following the inspection. This AK accuracy report compared the two most prevalent radionuclides as indicated by available NDA characterization data, ²⁴⁰Pu and ²³⁹Pu, to the two most prevalent radionuclides identified in the AK Summary Report (AKSR), ²³⁹Pu and ²³⁸U. The NDA characterization data did not match the most prevalent radionuclides identified by the AKSR, as had been indicated as a possibility in the AKSR. AK data indicated that a few containers may contain relatively large quantities of ²³⁸U by mass, causing ²³⁸U to dominate the mass-based determination of the most prevalent radionuclides presented in the AKSR. The sample of containers that were chosen as part of the AK BDR review did not contain detectable quantities of ²³⁸U, so this was excluded from the most prevalent radionuclides by mass based on actual container assays. DOE-WIPP-02-3122, the Waste Acceptance Criteria (WAC), requires the determination of the two most prevalent radionuclides and does not specify whether this calculation must be done in terms of mass or activity.

Providing notification to EPA upon completion of subsequent AK accuracy reports for every waste stream is a T2 notification requirement. Consistent with EPA's authority under 40 CFR 194.24(h), EPA may request this information if the Agency deems it necessary to ensure continued compliance with EPA regulations. (See Table 1, which includes this as a T2 change.)

(3) NDA-AK communication was assessed and found to be adequate following revision of key documents.

All TRU WC sites formally implement AK-NDA communication to ensure appropriate use of AK data. CCP-TP-005 requires the preparation of an AK-NDA memorandum:

Prepare a NDA Memorandum to CCP Records CH waste only, evaluating the radionuclide characterization of the waste stream. The NDA Memorandum must include

⁴ Energx is the Foster Wheeler Environmental Corporation that operates the TRU Waste Processing Center on the ORR. In this report Energx and Foster Wheeler are synonymous.

a section for an assessment written with the NDA EA determining how the AK will be applied during assay. For LANL sealed sources waste, the NDA Memorandum must include a section written with the Off-Site Source Recovery (OSR) RCTS. This assessment should include a discussion of the limitations of the radiological characterization in the AK document and a description of the required assay methods, if any. Any NDA issues for both measured and calculated radionuclides should be discussed and resolved.

EPA examined the AK-NDA memorandum and identified several inconsistencies between the memorandum and the AKSR, as well as questions concerning the Discrepancy Resolution Report (DRR) that might ultimately affect the AK-NDA memorandum [see Items (11) and (16), below]. EPA noted that the AK-NDA memorandum did not specify how NDA personnel will use the AK data. EPA discussed this concern with ORNL-CCP AK personnel and included it on an EPA Inspection Issue Tracking Form (See Attachment C.9 of this report for a copy of this form); this issue is discussed below.

EPA Inspection Issue Tracking Form, Issue No. ORNL-CCP-CH-AK-07-009CR: The AK-NDA memorandum attached to CCP-TP-005, Attachment 7, does not specify how NDA personnel will use the AK data. The use of AK data by NDA personnel should be specified through statement in the AK-NDA memorandum or reference to the appropriate NDA procedure.

Resolution: The AK-NDA memorandum was initially revised to address this concern directly following the inspection. EPA received another revision dated January 7, 2008, titled CCP-AK-ORNL-001, NDA Memo, *Radiological Evaluation of Waste Stream OR-NFS-CH-HET, Nuclear Fuel Services Contact-Handled Transuranic Waste Stored at Oak Ridge National Laboratory*, Revision 1. This revision of the memorandum indicates how and when default isotopics will be used. It also included the information used to develop the default isotopics for the waste stream and a complete discussion regarding how those default values were generated. The revised memorandum is adequate and addressed the concerns raised by EPA during the baseline inspection.

Status of Concern: Issue No. ORNL-CH-AK-07-009CR is closed.

Considering the importance of communication between AK and NDA staff to resolve discrepancies between the isotopics information in the AK record and what is observed during NDA measurements, it is possible that the AK-NDA memorandum would be revised when such discussion takes place. EPA needs to be notified if the AK-NDA memorandum is revised to reflect changes in isotopics as more CH debris waste drums or TRU drums containing other waste categories undergo NDA measurements. When the AK-NDA memorandum is revised, EPA must receive notification as a T2 change. Consistent with EPA's authority under 40 CFR 194.24(h), EPA may request this information if the Agency deems it necessary to ensure continued compliance with EPA regulations. (See Table 1, which includes this as a T2 change.)

(4) AK procedural accuracy was assessed and was found to be adequate.

Procedure CCP-TP-005 describes the processes used by ORNL-CCP to compile, review, evaluate, update, and report AK documentation. The procedure also describes how ORNL-CCP

(1) determines AK sufficiency and accuracy; (2) reevaluates AK documentation; (3) resolves AK documentation discrepancies, when necessary; (4) uses AK to delineate waste streams; and (5) determines if a waste is hazardous.

Implementation of CCP-TP-005 is based on the (1) Waste Isolation Pilot Plan Hazardous Waste Facility Permit, Waste Analysis Plan (WIPP WAP), which authorizes the use of AK to delineate waste streams and characterize hazardous waste; (2) CCP-PO-001, *CCP Transuranic Waste Characterization Quality Assurance Project Plan*; and (3) the WAC AK requirements addressed in CCP-PO-002, *Transuranic Waste Certification Plan*. EPA requires that CCP-TP-005 adequately convey AK elements to address the requirements of the WIPP WAP, the WAC, and 40 CFR 194.24. EPA found that the procedure satisfied these requirements. Providing notification to EPA regarding changes made to AK procedures that require CBFO approval is a T2 change. (See Table 1, which includes this as a T2 change.)

(5) Load management was examined and found to not apply at ORNL-CCP at this time.

During the inspection, the ORNL-CCP Acceptable Knowledge Expert (AKE) stated that ORNL-CCP is not seeking approval to perform load management, and EPA excluded evaluation of load management from the scope. EPA did not evaluate load management during the inspection. Implementation of load management would be a T1 change and must be in accordance with the Appendix E of the CBFO WAC. (See Table 1, which includes this as a T1 change.)

(6) The definition of the waste stream was evaluated and found to be appropriate.

The WIPP WAP and WAC define a waste stream as “waste material generated from a single process or from an activity which is similar in material, physical form, and hazardous constituents.” Waste Stream OR-NFS-CH-HET consists of CH TRU mixed heterogeneous debris (S5400) waste generated at NFS and stored at ORNL. ORNL-CCP has characterized the waste stream as RCRA-hazardous waste under 40 CFR Part 261, Subpart C.

This waste stream contains debris from the final decommissioning phase of NFS Building 234, which occurred between 2000 and 2003. It includes 144 55-gallon drums, some of which are the result of size reduction and repackaging of boxed waste. The wastes were packaged at NFS from April 2001 to September 2003, and a portion of the waste underwent size reduction and repackaging at the TWPC from December 2005 to May 2007.

EPA reviewed the methodology and supporting AK documentation used by ORNL-CCP to define the waste stream in terms of physical form, radiological characteristics, chemical usage, potential hazardous materials, and prohibited items, as well as the ability of the site to segregate them from the waste stream. EPA found that Waste Stream OR-NFS-CH-HET was appropriately defined. The wastes were generated by the same D&D process that was performed over a specified time period. ORNL-CCP representatives stated that waste was not intentionally segregated based on physical, chemical, or radiological components (radionuclides). While individual containers may exhibit different physical properties, ORNL-CCP indicated that it anticipated that the waste stream will contain approximately equivalent amounts of organic and inorganic debris, so the physical form is well defined. Based on the assumption that the

radiological components are distributed equally throughout the waste stream, a common radiological composition is assigned to containers within the waste stream. EPA does not assess hazardous components within the waste, although data suggest that the waste may contain common hazardous constituents.

According to the AKSR, debris waste from the initial phase of decommissioning, in the early 1990s, will be added to Waste Stream OR-NFS-CH-HET at a later date. These wastes consist of 261 drums of NFS debris waste currently in storage at ORNL that will be evaluated for possible inclusion in OR-NFS-CH-HET. In addition, there are nine B-25 boxes that may be TRU waste after repackaging into 55-gallon drums at the ORNL TWPC, at which time they will also be evaluated for possible inclusion in this waste stream. EPA expects any AK Summaries that address wastes beyond the 144 drums covered by this baseline inspection to fit the waste stream as defined. Providing AK Summaries that include additional waste is a T2 change. (See Table 1, which includes this as a T2 change.)

(7) The use of quick or fast scan was examined and found to be adequate.

The CCP AKE indicated that Foster Wheeler performs a fast scan of containers using their own internal process and procedures to initially screen containers for the presence of prohibited items, WAC requirements, and other non-WIPP-related requirements. The data are used to release containers to ORNL-CCP, which performs 100% NDE (RTR) on TRU waste containers. Although not in the AK record to date, EPA recommends that this information be integrated to ensure the availability of potentially important data on containers as they are processed. ORNL-CCP should ensure that quick or fast scan records are referenced in the AK record.

(8) Staff training was examined and found to be adequate.

Qualification and training of ORNL-CCP personnel is implemented through CCP-QP-002, *CCP Training and Qualification Plan*. With respect to AK, the plan applies to personnel compiling AK information for ORNL-CCP and evaluating and resolving discrepancies associated with TRU waste destined for the WIPP. According to the plan, all qualification and training candidates are required to complete a qualification card to verify that they possess the knowledge and skills necessary to competently perform specified tasks. EPA inspectors reviewed the plan, interviewed Jeff Harrison (AKE) and David Adkins (Site Project Manager (SPM)), and evaluated their qualification cards. These individuals had performed required reading pertinent to applicable portions of the WIPP WAP and WAC, State and Federal RCRA regulations associated with solid and hazardous WC, discrepancy resolution and reporting processes, and site-specific procedures associated with WC using AK. However, ORNL-CCP does not specifically incorporate EPA requirements relative to WIPP Performance Assessment in the training program, and EPA suggests that the program be modified in the future to incorporate these requirements, particularly since the second recertification application will be submitted in 2008 and could directly affect characterization requirements. EPA found that staff training of ORNL-CCP personnel was adequate.

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

Several containers were selected to assess drum traceability for the 144-drum population generated from approximately 2000–2003: X10C0501112 (repackaged from drum X1060506029), X10C0505990 (original drum), X10C0501270 (repackaged from drum X10C0506019), and X10C0501382 (repackaged from box AOC0506144). These containers were selected to sample containers from repackaged drums, containers from repackaged boxes, and drums that were not repackaged. All containers were assayed at NFS prior to shipment (see Item (15) for discussion of NFS assay). In addition, at the TWPC prior to ORNL-CCP's involvement, each repackaged container underwent NDA twice (before and after packaging), as well as VE and RTR; a single NDA and RTR were performed on all drums that were not repackaged. The later characterization sequence took place in 2006. ORNL-CCP plans to characterize each container again via NDA and RTR. Therefore, traceability was followed from the original waste item descriptions for each container from NFS through the second Foster Wheeler radioassay or assays (reference M017), radiography sheets (M018), and VE (M019). ORNL-CCP representatives stated that the Oak Ridge EM Database documented data obtained from NFS as well as information from the Foster Wheeler characterization effort. Of the containers selected, all but X10C0501382 underwent both RTR and NDA by ORNL-CCP, and BDRs for these three containers were provided to further demonstrate traceability. Additionally, ORNL-CCP PTS data printouts for the containers and other container identification on the CCP AK Tracking Spreadsheet were examined. As a result of this analysis, data traceability was adequately demonstrated. Note that because the default isotopics used by Foster Wheeler and ORNL-CCP differed, the isotopic distributions for the same container often differed depending on the source of the values.

- (10) Limitations and exclusions associated with the AK record were assessed and found to be acceptable.

Every AK source document has an associated Record of Communication (Attachment 3) that lists or identifies AK data limitations. Each of the examples provided either listed a limitation or stated that there were no limitations. It should be noted that the AKE indicated that additional references were being added to the AK record to address future containers. Several references identified had not yet been included in the AKSR (Attachment 4), so it was not possible to determine whether the AK record was complete. In the future, AK Summaries and related reference lists must be complete with respect to addition of data and references. The continual updating of references during the inspection does not demonstrate that data limitations and exclusions have been adequately assessed because data evaluation is still “in process” for the waste stream being inspected. Providing notification to EPA upon completion of Attachment 4 for Waste Stream OR-NFS-CH-HET is necessary as a T2 change. Consistent with EPA's authority under 40 CFR 194.24(h), the Agency may request this information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1, which includes this as a T2 change.)

(11) Discrepancy resolution (AK-AK) was examined and found to be adequate following revision of specific documents.

ORNL-CCP prepared an AK-AK Discrepancy Resolution DR002 to assess numerous differences between NFS and Foster Wheeler NDA measurement data, as well Foster Wheeler pre- and post-repackaging discrepancies. The discrepancies identified included the following:

- Incorrect reporting of ^{242}Pu by NFS, differences between scaled and actual measured data from NFS (and subsequent decision to use TWPC data)
- Differences between the reported ^{235}U and ^{238}U masses by NFS and the TWPC
- ^{228}Th and ^{232}Th values reported by NFS that were not verified by the TWPC
- Different isotopic compositions for various fuels generated/managed within Building 234, including differences in plutonium isotopics and ^{235}U enrichment
- Different ^{238}U values before and after measurement at the TWPC

EPA noted that the AK discrepancy discussions were incomplete primarily because, while the discrepancies were identified, ORNL-CCP did not resolve them and instead stated that it believed the discrepancies would not pose an issue with respect to overall characterization of the waste stream. EPA discussed this concern with ORNL-CCP AK personnel and included it on an EPA Inspection Issue Tracking Form (see Attachment C.7 of this report for a copy of this form); this issue is discussed below.

EPA Inspection Issue Tracking Form, Issue No. ORNL-CCP-CH-AK-07-007CR:

Discrepancy Report DR002 identifies several discrepancies, but discrepancy resolutions are incomplete. For example, additional discrepancy resolutions are required for ^{235}U and ^{238}U discrepancies between NFS and TWPC NDA data, detection of ^{228}Th and ^{232}Th , isotopic data inconsistencies between Halden and Savannah River Site (SRS)⁵, ^{238}U occurrence inconsistencies, and ^{235}U enrichment inconsistencies with respect to SRS material. Resolution of these issues could result in changes to the waste stream ORNL-NFS-CH-HET AK-NDA memorandum and the AKSR.

Resolution: Discrepancy Report DR002 was modified to indicate why ^{238}U was detected by NFS and TWPC in a single container prior to repackaging, but not after repackaging, as this was due to “two segments of the assay being too dense to accurately quantify the radionuclides” and “significant gamma deadtime” that lead the NDA operator to not report $^{235}\text{U}/^{238}\text{U}$ in the repackaged container. Overall discrepancies in reporting uranium were attributed to differences in detection limits for the various instruments used. Thorium detection at NFS was attributed to possible background radiation (due to a lack of measurement system shielding), and the overall lack of precision and accuracy characteristics associated with the NFS VAGAS system was identified as a reason ORNL-CCP considered the NFS data to be questionable. ORNL-CCP indicated that contract specifications and direct data from SRS are the more credible sources of information pertinent to SRS isotopic discrepancies. However, ORNL-CCP provided no reason

⁵ The four waste streams are related to fuel produced according to specifications in contracts for four clients: SEFOR, Consumer’s Power, Dupont/SRO (SRS) and Halden.

why the Halden isotopics presented in reference U016 were more credible than in other documents (it is assumed that this is because U016 is a “graphical worksheet” as opposed to a presentation, as shown in U017). Transcription errors were also attributed to ²³⁵U value discrepancies.

Status of Concern: The response is adequate. ORNL-CCP has revised Discrepancy Resolution DR002 to address how the discrepancies were resolved, and this concern is closed.

Providing notification to EPA upon completion of all radiological DRRs pertinent to this waste stream is a T2 change. Consistent with EPA’s authority under 40 CFR 194.24(h), the Agency may request this information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1, which includes this as a T2 change.)

(12) Defense origin of waste was examined and accepted.

The WIPP WAC requires generator sites to use AK to determine if the TRU waste streams to be disposed at the WIPP meet the definition of TRU “defense” waste. TRU waste is eligible for disposal at the WIPP if it has been generated in whole or in part by one of the atomic energy defense activities listed in Section 10101(3) of the Nuclear Waste Policy Act of 1982. According to the site, the basis for the “defense” nature of Waste Stream OR-NFS-CH-HET is that the Building 234 facility performed mixed-oxide (MOX) fuel fabrication and ²³³U purification under subcontracts to two government contracts administered by the U.S. Atomic Energy Commission as well as under two smaller commercial contracts. The two larger contracts were national defense-rated orders that were designated DO-E2 certified for national defense use under Defense Material System, Regulation 1. The defense and commercial activities used the same process equipment, so the source of contamination is indistinguishable. Therefore, the site argued that the TRU wastes from decommissioning are linked primarily to defense nuclear material production. EPA reviewed the site’s supporting documentation and found that the site’s argument is reasonable, noting that EPA does not perform a detailed and thorough analysis of the defense determination status.

(13) AK information pertaining to the radiological characteristics of the waste was examined and found to be adequate.

AK data presented in the Waste Stream CCP-AK-ORNL-001 AKSR, related AK-NDA memoranda, discrepancy resolution information, and various supporting references were examined to understand the anticipated radiological composition of the waste stream, development of default isotopics, and relevance/appropriateness of these distributions to the stream. Relevant references addressing radiological characteristics of the waste include C099, C100, C122, DR002, M012, M016, M007, M017, P256, P268, U016, U017, U040, and P284.

CCP-AK-ORNL-001 states that waste within the stream was generated through D&D of Building 234, which was used for production and other activities related to MOX fuels. Additionally, a portion of the building was used as a ²³³U purification process facility. The portion of the building that was used for ²³³U was decommissioned in 1983, and waste from this activity is not included in the waste stream. The D&D process was initiated in 1990 and

continued to 1993. Wastes generated during this early D&D activity included cement that was removed to remediate concrete flooring in Building 234, rashig rings removed from production tanks, and various glovebox metals/other building metals and materials that were sent through a size reduction/shredder called the Decontamination and Volume Reduction Facility (DVRF). Waste from the DVRF was ultimately supercompacted at NFS and is not part of the waste stream. D&D of Building 234 ceased in 1993 due to financial considerations, but it resumed in 2000–2001 and continued until 2003. Waste generated during the later portion of the D&D process included various debris materials typical of D&D operations; see Item (14), below.

Building 234 managed and performed MOX fuel-related activities from four different contracts. Table 5, below, presents the radionuclide compositions of these materials (C099, C100, C122, DR002, P212, U016, U017).

Table 5. MOX Fuel Compositions

Contract	Pu Percent	U Percent	Pu (kg)	U (kg)	Total (kg)
SEFOR	20	80	746	2984	3730
Consumers	2.27	97.9	47	2027	2070.48
SRS	0.31	99.7	16	5064	5079.37
Halden	2.5	99.5	3	117	120
Total	-	-	812	10,192	11,000

These data show that uranium is the dominant radionuclide in terms of mass for each material.

Fuels generated for the four contracts had specified isotopic distributions, as shown in Table 6, below.

Table 6. Mass Isotopic Distributions of MOX Fuels by NFS Contract

Radionuclide	SEFOR		Consumers		SRS		Halden	
²³⁸ Pu	0.01	0.04	0.01	0.43	--	--	0.01	0.29
²³⁹ Pu	18.13	90.63	1.73	76.24	0.29	90.94	2.00	79.89
²⁴⁰ Pu	1.67	8.33	0.37	16.34	0.02	7.99	0.36	14.51
²⁴¹ Pu	0.10	0.48	0.07	2.91	0.003	0.99	0.06	2.24
²⁴² Pu	0.01	0.05	0.03	1.1	0.0002	0.08	0.02	0.83
²⁴¹ Am	0.09	0.47	0.06	2.86	--	--	0.06	2.20
Total	20.0	100	2.27	100	0.31	100	2.5	100
²³⁴ U	0.12	0.15	0.58	0.59	0.001	0.001	3.90	4.00
²³⁵ U	0.28	0.35	2.36	2.41	0.30	0.30	4.88	5.01
²³⁸ U	79.60	99.50	94.96	97.00	99.40	99.69	88.73	91.01
Total	80.0	100	97.9	100	99.7	100	97.5	100

Note: For each of these materials, the first column represents the overall mass fractions of the MOX fuel, and the second column provides the mass fractions of the fuel's plutonium and uranium constituents separately.

The AKSR states that NFS assayed TRU waste generated during the 2000–2003 (final) phase of decommissioning using the VAGAS. The VAGAS employed four to six high-efficiency germanium detectors to measure the contents of a 55-gallon drum (References I067, M003).

After being shipped to ORNL, nearly all of this waste was reassayed at the TWPC in 2006 using Imaging Passive Active Neutron (IPAN) and Segmented Gamma Scanner (SGS) systems. Reference M017 states that ORNL-CCP considered the later TWPC assay to be AK, although it was performed in 2006, because “it was performed prior to implementation of the CCP TRU waste certification program at ORNL.” ORNL-CCP noted several discrepancies between the NFS and TWPC data and addressed these discrepancies in Discrepancy Report DR002, as discussed in Item (11), above. Based on the discrepancy analysis and resolution presented in Discrepancy Report DR002, ORNL-CCP considered the TWPC data to be more reliable than the NFS data, primarily because of unknowns associated with the NFS measurement system. This conclusion appears reasonable. ORNL-CCP therefore used this information to generate general isotopic ranges expected for various radionuclides, presented as Table 5-4 in the AKSR and as Table 7, below.

Data on this table indicate that the waste stream is anticipated to consist primarily of a mixture of uranium and plutonium, with the predominant radionuclides by activity being ^{239}Pu , ^{240}Pu , ^{241}Pu , and ^{241}Am . The predominant radionuclides by mass are anticipated to be ^{238}U and ^{239}Pu based on AK data. As presented in Item (11), above, significant uncertainties are associated with measuring ^{238}U , and the ORNL-CCP measurement system is not sensitive enough to detect ^{238}U except when it is present in substantial quantities. Therefore, while previous systems identified ^{238}U as a predominant radionuclide by mass, measurements by ORNL-CCP may not identify ^{238}U ; therefore, the predominant radionuclides by mass detected by ORNL-CCP may ultimately be ^{239}Pu and ^{240}Pu . This lack of instrument sensitivity may result in underreporting of ^{238}U .

ORNL-CCP representatives indicated that default isotopics were calculated based on the amount of MOX fuel processed for each material and its isotopic distributions characteristics. Based on this information, the radionuclide contribution from each material type was scaled to the amount of MOX it contributed to the total to derive a default isotopic distribution representative of the overall material managed in Building 234. Specifically, the default isotopics were calculated assuming each material type contributed to the total radionuclide content of the waste, but the percentage of plutonium contributed by each material type was scaled based on the quantity of material managed in Building 234. Default mass fractions were decay corrected to October 1, 2007. The decay-corrected default mass fractions are as follows:

	Plutonium % Uncertainty	
^{238}Pu	0.044%	0.0044%
^{239}Pu	90.837%	9.0837%
^{240}Pu	8.893%	0.8893%
^{241}Pu	0.104%	0.0104%
^{242}Pu	0.122%	0.0122%
^{241}Am	1.115%	0.1115%

Plutonium isotopic values for each material type were based upon contract/manufacturing specifications that ORNL-CCP believes to be the most accurate source of isotopic information for each material. ORNL-CCP assumed that this default isotopic distribution, based upon the type of plutonium managed in Building 234, was equally distributed in all material removed during D&D. ORNL-CCP representatives stated that there are no data to suggest that materials

Table 7. Radionuclide Distribution for Waste Stream OR-NFS-CH-HET

Radionuclide	Radionuclide Total Weight Percent ¹	Range in Weight Percent by Radionuclide for Individual Containers ²	Total Curies % Radionuclide ³	Range in Curies by Radionuclide for Individual Containers ⁴	Suspected To Be Present? (Yes or No)
WIPP Tracked Radionuclides					
²⁴¹ Am	0.15	0.03–2.86	4.97	2.08–17.09	Yes ⁶
²³⁸ Pu	0.01	0.00–0.43	1.81	0.00–5.88	Yes
²³⁹ Pu	23.06	1.80–94.04	13.78	7.54–37.92	Yes
²⁴⁰ Pu	2.74	0.26–16.34	5.99	3.30–17.81	Yes
²⁴² Pu	0.02	0.00–1.17	Trace	0.00–Trace	Yes
²³³ U ⁷	Trace ⁵	0.00–Trace	Trace	0.00–Trace	Yes
²³⁴ U	3.42	0.00–4.00	0.21	0.00–0.80	Yes
²³⁸ U	69.94	0.00–99.69	Trace	0.00–Trace	Yes
¹³⁷ Cs	Trace	0.00–Trace	Trace	0.00–Trace	Yes
⁹⁰ Sr ⁸	Trace	0.00–Trace	Trace	0.00–Trace	Yes
Additional Radionuclides					
²⁴³ Am	Trace	0.00–Trace	Trace	0.00–Trace	Yes ⁹
²³⁷ Np	Trace	0.00–0.05	Trace	0.00–Trace	Yes
²⁴¹ Pu	0.07	0.00–2.91	73.24	23.56–83.90	Yes
²³⁵ U	0.59	0.00–5.01	Trace	0.00–Trace	Yes

¹ This listing indicates the total weight percent of each radionuclide over the entire waste stream.

² This listing is the weight percent range of each radionuclide on a container-by-container basis. Some containers where “0.00” is listed as the lower range will not contain the specified radionuclide.

³ This listing indicates the total activity percent (in curies) of each radionuclide over the entire waste stream.

⁴ This listing is the curie percent range of each radionuclide on a container-by-container basis.

⁵ “Trace” indicates less than 0.01 weight percent for that radionuclide.

⁶ ²⁴¹Am may be present in slightly larger percentages due to the further decay of ²⁴¹Pu.

⁷ ²³³U was not reported in waste assay data for this waste stream but may be present in trace quantities, as described above.

⁸ ⁹⁰Sr cannot be quantified by gamma spectrometry. Its value is calculated based on measured ¹³⁷Cs values. A ⁹⁰Sr/¹³⁷Cs scaling factor of 1.0 is used to calculate the ⁹⁰Sr contribution.

⁹ These weight percent ranges were expanded based on the plutonium and uranium isotopic distribution data provided in Table 6.

were managed in specific areas or that D&D wastes can be tied to any individual material type, so assuming that the default isotopics occurred in all D&D waste is reasonable. EPA examined the default isotopic calculations and determined that the calculation approach used by ORNL-CCP is reasonable, based on available data, noting that isotopic-specific values obtained by measuring each container may exhibit considerable variability.

EPA also examined previous NDA measurements taken at NFS and the TWPC to understand the origin of these values and to assess if the individual measurements should have been used to derive isotopics instead of the material specification data. ORNL-CCP representatives indicated that the NFS data were obtained using a measurement system that appeared to be more sensitive than that used by either the TWPC or ORNL-CCP, so that actual radionuclides were identified and quantified via measurements. However, ORNL-CCP representatives also stated that because of the uncertainty associated with the measured NFS values, they were not confident in the accuracy of the measurements. TWPC measurements were obtained using the same instrumentation as used by ORNL-CCP, but ORNL-CCP representatives indicated that the default isotopics used by the TWPC were based on “generic” MOX distributions (reference U144) rather than material-specific calculations. Therefore, the TWPC measurements, while more reliable than NFS data, are not as accurate as those that will be obtained by ORNL-CCP. ORNL-CCP representatives indicated that the waste stream may be expanded to include additional material, and the radionuclide composition will also be assessed with the addition of containers. EPA assumes that this information will be included in the T2 submissions discussed in Section (10), below, and Sections (14) and (15), below.

(14) Identification of WMPs and prohibited items was assessed and found to be adequate.

ORNL-CCP addresses WMP calculations in Attachment 6 of CCP-TP-005 and through an attached memorandum. ORNL-CCP first examined both RTR and VE information for the 144 containers included in the inspected population to understand the overall physical composition of the stream and to calculate the amount of material present by WMP. Data from RTR, conducted by Foster Wheeler at the TWPC facility, were available for all containers in the population, and VE data were available for those containers that were repackaged. ORNL-CCP examined individual data sheets for each container and obtained the masses of specific waste items as identified on the original RTR/VE data sheets. ORNL-CCP then assigned the identified material to a WMP group and determined the total mass of each WMP and subsequent weight percent. Based on this information that showed the stream to be composed of approximately 43% organic debris and 57% inorganic debris, ORNL-CCP assigned a WMC of S5400 to the stream. Individual containers may vary significantly from this overall stream weight percent. Also, available data suggest that some of the drums may contain solidified fines as a solidified inorganic matrix, but the presence of this material does not change the Summary Category Group S5000 designation for any of the 144 drums in the stream.

CCP-AK-ORNL-001 addresses prohibited items. This AKSR states that the only prohibited items identified in this waste stream were sealed containers greater than 4 liters. ORNL-CCP also stated that “small quantities” of liquids have also been identified in drums, and these shall be remediated prior to disposal at the WIPP. ORNL-CCP identifies containers with prohibited items, including liquids, through the NCR process. Items containing prohibited quantities of

liquids are captured on NCRs and identified in the ORNL-CCP CTS; ORNL-CCP will not designate these containers as WIPP eligible until all NCRs are resolved.

Providing notification to EPA when Attachment 6 and the associated memoranda are revised for this waste stream is a T2 change. Consistent with EPA's authority under 40 CFR 194.24(h), the Agency may request this information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1, which includes this as a T2 change.)

(15) The AKSR for a waste stream for CCP-AK-ORNL-001 was assessed and found to be adequate following revision.

A single AKSR for one waste stream was available for EPA inspection. Waste Stream OR-NFS-CH-HET is CH TRU mixed heterogeneous debris waste generated at NFS in Erwin, Tennessee, and stored at ORNL. NFS Building 234 was used to fabricate MOX fuel for four clients, and related fuel-processing activities were performed in the building. A portion of the building was also used for a ^{233}U purification process. Building 234 operated from 1965 through 1973, and D&D of the building took place from 1993 through 1994, and again from 2000 or 2001 through 2003. The waste in Waste Stream OR-NFS-CH-HET was generated from 2000 through 2003 by the D&D of Building 234 at NFS and included both drummed and boxed wastes that were subjected to RTR and NDA prior to shipment to ORNL. Waste shipped to ORNL was characterized at the TWPC in 2006; boxed waste was repackaged at the TWPC and underwent VE, RTR, and NDA. Most of the drums created at NFS were repacked and also underwent VE, RTR, and NDA at the TWPC, but some of the original NFS drums were not repackaged and underwent only NDA and RTR at the TWPC. At the time of the EPA inspection, the waste stream consisted of 144 drums, 62 of which were created by repackaged boxes, 58 from repackaged drums, with the remaining 24 consisting of original drums.

EPA reviewed the single AKSR and noted several discrepancies between the AKSR and the AK-NDA memorandum (DR002), as discussed in Items (11) and (3) above. EPA discussed this concern with ORNL-CCP AK personnel and included it on an EPA Inspection Issue Tracking Form (see Attachment C.8 of this report for a copy of this form); this issue is discussed below.

EPA Inspection Issue Tracking Form, Issue No. ORNL-CCP-CH-AK-07-008CR: AK Summary Report CCP-AK-ORNL-001 lacks sufficient detail with respect to technical issues that have the potential to impact AK WC. Examples include the following:

- Occurrence, source, and potential distribution of ^{233}U
- Previous AKSR conclusions and information, including the distribution of default isotopic distributions
- Consistency of isotopic and other information with respect to NDA-AK memorandum information
- Examination and updating of document to include relevant information from references such as U044 that has not been added to the AK reference list or addressed in the AKSR
- Additional process information (e.g., MOX generation)

- Addition of references included in the NDA-AK memorandum
- Additional changes based on the assessment and integration of AK data, including changes required due to discrepancy resolution as addressed in EPA Concern No. ORNL-CCP-CH-AK-07-007CR, Final, and the NDA-AK memorandum addressed in EPA Concern No. ORNL-CCP-CH-AK-07-009CR, Final.

Resolution: The AKSR was revised, and changes pertinent to the EPA concern include the following:

- Additional information pertaining to the two major government contracts for fuel fabrication
- General data concerning decommissioning of facility areas that were used for ^{233}U purification
- Additional production operation information, including MOX pellet production, scrap dissolution and recovery, and additional decommissioning information
- Overview of TRU waste generation and management information
- Additional decommissioning information with an emphasis on early (1993–1994) activities
- Historic assay processes and data, e.g., NFS, Waste Examination and Assay Facility (WEAF), TWPC
- Revision to include ^{238}U , ^{235}U , ^{228}Th , and ^{232}Th discrepancy resolution information consistent with DR001, Revision 1
- Additional discussion about the two most prevalent radionuclides by mass
- Additional references, but not P284 and P285, that were identified in the NDA-AK memorandum

Status of Concern: The AKSR was revised to address most of the issues raised by EPA. However, the revised AKSR did not reference the documents that were included in the AK-NDA memorandum nor did it address the development of default isotopics, as requested. However, the revised NDA-AK memorandum provided this information, and upon examination the EPA inspection team determined that all required information was provided, in either the AKSR or the NDA-AK memorandum. EPA considers this concern to be closed and EPA also considers the NDA-AK memorandum a necessary part of this response. When ORNL-CCP revises the AKSR, the revised version should reference the documents included in the NDA-AK memorandum such that both documents contain similar information. Accordingly, AK and NDA personnel will be aware of important information pertinent to the development of default isotopics.

This inspection was limited to retrievably-stored debris waste. Because AK data for wastes outside this category (i.e., soils/gravel and solids and newly-generated debris) may be very different than the information examined, implementation of the AK process for wastes other than retrievably-stored debris is a T1 change. (See Table 1, which includes this as a T1 change.) Revisions of existing WSPFs, associated AK Summaries, AK accuracy, Radiological DRRs,

including those prepared to address AK-measurement discrepancy, may all be pertinent. Providing notification to EPA upon completion of revisions of the existing WSPF and associated AKSR and/or generating new WSPFs, AK summaries, and/or documentation reports is required as this is a T2 change. Consistent with EPA's authority under 40 CFR 194.24(h), the Agency may request this information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1, which includes this as a T2 change.)

Summary of AK Findings and Concerns

The EPA inspection team did not identify any findings related to AK during this inspection. EPA did identify the three concerns that are discussed above. Attachments C.7, C.8 and C.9 to this report provide copies of the EPA Inspection Issue Tracking Forms documenting these concerns. EPA considers these three concerns to have been adequately addressed, and there are no open issues with respect to this inspection.

Baseline Approval

EPA is proposing for approval the AK process for CH retrievably-stored TRU debris (S5000) that was evaluated during this baseline inspection as described in this report. Application of the AK process described in this report to wastes other than retrievably-stored CH TRU debris is a T1 change. (See Table 1, which includes this as a T1 change.)

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:

- Implementation of load management
- Implementation of AK for wastes other than retrievably-stored debris (i.e., retrievably-stored solids and soil/gravel and/or any newly-generated waste)

ORNL-CCP must report and submit documentation on T1 changes when it is ready for EPA review. Upon initial review, EPA will inform ORNL-CCP and CBFO whether a site inspection is necessary. EPA may request additional information, choose to conduct a desktop review, and/or confer with ORNL-CCP personnel. Upon evaluation (with or without site inspection), EPA will issue an approval letter, and only upon receiving the EPA approval can ORNL-CCP dispose of the new waste at the WIPP or implement the activity deemed to be a T1 change.

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

- Notification to EPA upon completion of new versions or updates/substantive modifications to AK accuracy reports (prepared annually)
- Notification to EPA upon completion of new versions or updates/substantive modifications to AK-NDA communications and memoranda for Waste Stream OR-NFAS-CH-HET and/or forthcoming waste streams
- Notification to EPA upon completion of new versions or updates/substantive modifications to site AK procedures
- Notification to EPA upon completion of new versions or updates/substantive modifications to all AK Summaries that describe wastes beyond the 144 containers described in this report and updates to the existing Waste Stream OR-NFS-CH-HET summary
- Notification to EPA upon completion of new versions or updates/substantive modifications to Radiological DRRs (AK-AK and AK-NDA) pertinent to Waste Stream OR-NFS-CH-HET
- Notification to EPA upon completion of new versions or updates/substantive modifications to completed Attachment 4 and Attachment 6 for Waste Stream OR-NFS-CH-HET
- Notification to EPA upon completion of AK accuracy reports, new WSPFs, or revisions to existing WSPFs (and attachments)

Following EPA approval, at the end of each fiscal quarter, ORNL-CCP must provide EPA with information on T2 changes. EPA will evaluate these changes and inform ORNL-CCP whether the changes raise any concerns and require a response or if ORNL-CCP can continue to implement those changes.

8.2 Nondestructive Assay

During this inspection, EPA inspected a single NDA system, the DWAS IPAN/SGS located at the Foster Wheeler Melton Valley TRU Project Facility on the ORR. This unit is operated under the ORNL-CCP WC program, which EPA evaluated for the first time during this baseline inspection. The DWAS IPAN/SGS has operated previously but had not performed any WIPP assays.

Technical Evaluation

Since EPA had not reviewed this NDA system previously, this inspection included the following aspects:

- Design and technical capability of the DWAS IPAN/SGS hardware and software to perform the required analyses
- Adequacy of the ORNL-CCP assay program's documents and procedures

- Knowledge and understanding of the ORNL-CCP personnel involved in the NDA program

The checklist in Attachment A.2 and the documents listed below comprise the documents that EPA examined in assessing the DWAS IPAN/SGS during this inspection:

- CCP-TP-166, CCP Drum Waste Assay System Imaging Passive/Active Neutron Operations, Revision 0, October 12, 2007
- CCP-TP-167, CCP Drum Waste Assay System Imaging Passive/Active Neutron Calibration, Revision 0, October 12, 2007
- CCP-TP-168, CCP Drum Waste Assay System Imaging Passive/Active Neutron/Segmented Gamma Scanner Data Generation Level Validation, Revision 0, October 18, 2007
- CCP-TP-169, CCP Operating the Mobile Segmented Gamma Scanner, Revision 0, October 12, 2007
- CCP-TP-172, CCP Calibrating the Mobile Segmented Gamma Scanner, Revision 0, October 12, 2007
- BII-5183-CVR-001, Calibration and Validation Report DWAS IPAN, Revision 2, March 9, 2006, and Revision 3, November 2007
- MV-SGS0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revision 0, November 6, 2007 and Revision 1, December 19, 2007
- BII-TMU-5183-001, Total Measurement Uncertainty Report, DWAS IPAN, Revision 0, November 11, 2005
- CI-SGS01-TMU, Total Measurement Uncertainty for the MCS Melton Valley Segmented Gamma Scanner, Revision 1, October 23, 2007
- Canberra Memorandum, G. Westik to Alan Simpson, Calibration Verification Performed on October 17, 2007 for the MCS SGS Located at the Melton Valley Site, November 8, 2007
- CCP-TP-005, Revision 18, CCP-AK-ORNL-001 NDA Memorandum, October 17, 2007, with Attachments & Isotopic Calculations for NFS Waste
- CCP-TP-005, Revision 18, Reference U-016, J. Chapman, Graphical Workbook for Estimating Important Quantities of NFS Radioactive Waste Constituents; March 1992
- CCP-AK-ORNL-001, Central Characterization Project Acceptable Knowledge Summary Report for Nuclear Fuel Services Contact-Handled Transuranic Waste Stored at Oak Ridge National Laboratory, Waste Stream: OR-NFS-CH-HET, Revision 0, September 25, 2007
- ORNL Program List of Qualified Individuals, October 18, 2007
- Performance Demonstration Program for NDA of Drums System Registration Form
- Radionuclide Library Listing Filename C:\GENIE2K\CAMFILES\STD WIPP.NLB

- MV-SGS0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revision 0, November 6, 2007
- BII-TMU-5183-001, Total Measurement Uncertainty Report, DWAS IPAN, Revision 0, November 11, 2005
- CI-SGS01-TMU, Total Measurement Uncertainty for the MCS Melton Valley Segmented Gamma Scanner, Revision 1, October 23, 2007
- BII-5109-TN00-003, MCNP Calculations of the Mass Correction Factor from Neutron Absorption in the PDP Stainless Steel Source Can with the PDP Aluminum Rack for Various Matrices and Source Positions, BNFL Instruments, Los Alamos, New Mexico
- ORNL Program List of Qualified Individuals, October 18, 2007
- NDA BDR No. OR-DWAS-001
- NDA BDR No. OR-DWAS-002
- NDA BDR No. OR-DWAS-003

(1) The design and operational range of the DWAS IPAN/SGS were assessed and were found to be adequate.

The DWAS IPAN/SGS is a multimode NDA system housed in Building 7880-I of the TWPC and operated by ORNL-CCP for gamma and neutron-based assays of CH retrievably-stored debris (S5000) wastes in 55-gallon drums. The SGS component of the DWAS consists of two detectors: a high-resolution coaxial germanium detector that measures photon-emitting radionuclides in nine vertical segments to provide quantitative gamma data, and a fixed-position low-energy germanium (LEGe) detector fitted with a cadmium filter on the detector face that is used to provide isotopic (relative) values. The coaxial detector has two operational modes, depending on a container's specific attributes: a segmented efficiency mode, also called a summed spectrum or density-based mode, and a segmented transmission-corrected mode, also called a sum of segments or transmission-corrected mode. Gamma spectra from the LEGe are used in conjunction with either multigroup analysis (MGA) or FRAM⁶ software packages to determine the isotopic distribution of ²³⁸Pu, ²³⁹Pu, ²⁴⁰Pu, ²⁴¹Pu, and ²⁴²Pu, along with ²⁴¹Am, ²³⁵U and ²³⁷Np. Other radionuclides are quantified directly using Genie 2000 and NDA 2000 software. The LEGe isotopic determination is performed simultaneously with the coaxial-based quantitative assay, and spectra from both detectors are acquired and analyzed using Genie 2000 and NDA 2000 software. The coaxial detector's sum of segments mode is appropriate for most of the waste matrices expected at ORNL-CCP. The summed spectrum mode is better suited for containers with low plutonium content and bulk density up to 0.72 g/cm³.

The IPAN component of the DWAS consists of the following:

⁶ FRAM is an abbreviation for an isotopic identification computer-based program properly called Fixed energy Response function Analysis with Multiple efficiency.

- A shielded assay chamber that surrounds the waste container on all four sides, top, and bottom, containing a turntable to rotate the drum during assay; one side of the enclosure contains a 14 MeV neutron generator located inside a moderator assembly
- Shielded detector packages comprising a number of helium-3 (^3He) neutron detectors embedded within blocks of polyethylene
- Individual electronic counting units consisting of preamplifiers, amplifiers, discriminators, and other supporting hardware

The system operates in both active and passive modes and provides values for ^{239}Pu effective mass ($^{239}\text{Pu}_{\text{EFF}}$) and ^{240}Pu effective mass ($^{240}\text{Pu}_{\text{EFF}}$), respectively. The IPAN is currently configured to measure one of these two quantities depending on the nuclear material (plutonium) loading of a specific container. Values for other WIPP-tracked radionuclides are quantified based on measured values (gamma-based isotopic distributions) or known or established relationships (AK-based isotopics) in conjunction with the measured neutron-based quantity, or by using computational or correlation techniques (e.g., ^{242}Pu). The IPAN component uses active and passive mode determinations to provide two independent measures of the plutonium content of a waste container. The active mode result is expressed in terms of $^{239}\text{Pu}_{\text{EFF}}$, and the passive mode result is expressed in terms of $^{240}\text{Pu}_{\text{EFF}}$. The system makes a selection to use the active or passive results based primarily on the number of measured coincidence neutrons and the magnitude of the moderator and/or absorber/moderator correction factors (i.e., the moderator (MOD) and/or absorber/moderator (ABSMOD) indices) for passive and active modes, respectively.

Previous EPA inspection reports present a detailed technical description of $^{239}\text{Pu}_{\text{EFF}}$ and $^{240}\text{Pu}_{\text{EFF}}$ masses, and IPAN ABS, MOD and ABSMOD indices (see EPA Docket No. A-98-49, II-A4-65). The IPAN is calibrated for assays from the system's active mode lower limit of detection (LLD) to a maximum of 14.710 g of $^{239}\text{Pu}_{\text{EFF}}$, and the system's passive mode LLD to 2.050 g of $^{240}\text{Pu}_{\text{EFF}}$. The active mode has been confirmed at 10.494 g of weapons-grade plutonium (WG Pu), approximately 9.806 g $^{239}\text{Pu}_{\text{EFF}}$, and the passive mode has been confirmed at 32.076 g of WG Pu, approximately 1.89 g $^{240}\text{Pu}_{\text{EFF}}$. Confirmations used WG Pu sources as described in BII-5183-CVR-001, Revision 2, March 9, 2006. The active mode calibration is valid for waste matrices with ABSMOD indices between 22.251 and 276.800. The passive mode calibration is valid for waste matrices with MOD indices between 1.045 and 17.572. There are no issues relative to the design or operational range of the IPAN component of the ORNL-CCP DWAS system from this inspection.

The use of new, unapproved NDA equipment by ORNL-CCP or physical modifications to the DWAS IPAN/SGS unit observed during this inspection is a T1 change. (See Table 1 where this is included as a T1 change.)

- (2) System calibration and calibration confirmation of the DWAS SGS/IPAN NDA system had been performed and documented as required, following revision of one ORNL-CCP report.

Two reports document the calibration of the DWAS SGS/IPAN: the SGS component is described in MV-SGS0101-CAL-001, *Segmented Gamma Scanner-01 (SGS-01-01) Calibration*,

Confirmation and Verification Report, Revision 0, November 6, 2007, and the neutron component is described in BII-5183-CVR-001.

Gamma Calibration: Calibration of the SGS component was performed prior to the system's use by ORNL-CCP. There are four separate aspects of the gamma calibration:

- Energy calibration was performed using a ^{152}Eu source in 2005, including a term for resolution (full width at half maximum) for the coaxial detector, and for the LEGe detector using mixed gamma line sources; the coaxial calibration is absolute (i.e., expressed as observed counts per actual nuclear disintegration of the calibration source) while the LEGe calibration is relative.
- Reference peak calibration was performed in 2005 using a pulser to enable dead-time corrections to the coaxial detector.
- Transmission source calibration was performed in 2005 using a ^{152}Eu source to enable transmission corrections.
- Matrix calibration was initially performed in 1996 and subsequently updated with several additional data to produce the composite plot shown on page 43 of MV-SGS0101-CAL-001 with a matrix density range of 0.0 to 0.72 g/cm³.

The SGS component of the calibration was technically adequate, but the report MV-SGS0101-CAL-001 lacked several important technical details. EPA discussed this concern with ORNL-CCP NDA personnel and included it on an EPA Inspection Issue Tracking Form (see Attachment C.2 of this report for a copy of this form). The issue is discussed below.

EPA Inspection Issue Tracking Form, Issue No. ORNL-CCP-CH-NDA-07-002CR, Final:

The SGS calibration report MV-SGS0101-CAL-01, Revision 0, did not adequately document calibration of this NDA system. In general, the report's overall quality was lacking with respect to organization and attention to technical details. Examples include the following:

- SGS-01, *Calibration Qualification Summary*, does not state the system's operating range with respect to matrix (sample density), nor does the section on matrix drums (Section 3) adequately document the system's capabilities in this area.
- SGS-01 does not list the use of default (AK) isotopics as an option (19 of the 20 drums assayed to date have used AK isotopics).
- The document is unclear regarding whether this system will be used to sort TRU/non-TRU wastes in accordance with the 100 nCi/g criterion.
- Descriptions of the system's calibration of record do not accurately document what happened.

Resolution: ORNL-CCP personnel provided an electronic copy of Revision 1 of MV-SGS0101-CAL-01, dated December 19, 2007. ORNL-CCP modified the revised report to address the items listed above.

Status of Concern: ORNL-CCP's Revision 1 of MV-SGS0101-CAL-01, dated December 19, 2007, adequately addressed EPA's concern, and this concern is closed.

Gamma Calibration Confirmation: Calibration confirmation of the SGS component of the DWAS was performed using sources other than the $^{152}\text{Eu}/^{137}\text{Cs}/^{241}\text{Am}$ sources used for calibration, as required by DOE/WIPP-02-3122. ORNL-CCP NDA personnel provided objective evidence of the appropriate pedigree for all WG Pu sources that is documented in MV-SGS0101-CAL-01. The calibration sources consisted of WG Pu sources in a variety of gram values that were combined to produce the following gram values: 0.3 g, 10.5 g, and 32.0 g. The system passed all WAC calibration confirmation criteria. There are no technical issues with the calibration and calibration confirmation of the SGS component of the ORNL-CCP DWAS NDA system.

Neutron Calibration: The IPAN calibration was completely redone upon the system's implementation at ORNL-CCP in July 2005. Active mode calibrations were performed using a depleted uranium (DU) source, and the passive mode calibration was performed using a ^{252}Cf source. Both sources have the appropriate pedigree, as documented in BII-5183-CVR-001, and an effective mass value for each was developed and used in the IPAN calibration. ABS, MOD and ABSMOD indices and a matrix correction factor for each mode were developed using six surrogate matrix drums with the DU and/or ^{252}Cf sources assayed in nine positions each. Based on the MOD and ABSMOD indices developed, the IPAN's operational range adequately covers the breadth of waste matrices and activity loading anticipated at ORNL-CCP.

Neutron Calibration Confirmation: Calibration confirmation of the IPAN component of the DWAS was performed using sources other than the DU and ^{252}Cf sources used for calibration, as required by DOE/WIPP-02-3122. ORNL-CCP NDA personnel provided objective evidence of the appropriate pedigree for all WG Pu sources that is documented in BII-5183-CVR-001. The calibration sources consisted of WG Pu sources in a variety of gram values that were combined to produce the following gram values: 0.3 g (active mode), 10.5 g (active and passive modes), and 32.0 g (active and passive modes). The system passed all WAC calibration confirmation criteria except for the 32.0 g standard in the active mode. This was expected due to self-shielding that is a function of the encapsulated source design and application within the Performance Demonstration Program (PDP) stainless steel containers, an effect that is documented and which have been seen in previous inspections (see BII-5109-TN00-003). The upper limit of the IPAN's range was set at $14.710 \text{ g } ^{239}\text{Pu}_{\text{EFF}}$, as discussed above.

There are no technical issues with the calibration and calibration confirmation of the SGS or IPAN components of the ORNL-CCP DWAS system. Extension of or changes to the calibrated range for either the SGS or IPAN component of the DWAS IPAN/SGS system is a T1 change. (See Table 1, which includes this as a T1 change.) Notification to EPA upon completion of changes to software for the DWAS IPAN/SGS system, its SGS or IPAN operating range(s), and site procedures that address the system's calibration and/or operation that require CBFO approval is a T2 change. (See Table 1, which includes this as a T2 change.)

- (3) The total measurement uncertainty (TMU) of assays performed on the DWAS IPAN/SGS NDA system had been determined and documented, as required.

The determination of the TMU of assays performed on the DWAS IPAN/SGS system is addressed in two reports; CI-SGS01-TMU, *Total Measurement Uncertainty for the MCS Melton Valley Segmented Gamma Scanner*, Revision 1, October 23, 2007, for the SGS component; and BII-TMU-5183-001, *Total Measurement Uncertainty Report, DWAS IPAN*, Revision 0, November 11, 2005, for the passive and active neutron components. The components of uncertainty included in the TMU determination for the SGS of the DWAS included calibration source uncertainties (including drum fill height), counting statistics, self-absorption effects, matrix nonhomogeneities, nonuniform source distributions, and isotopic measurement uncertainties, end effects, and attenuation. The components of uncertainty included in the TMU determination for the IPAN component of the DWAS, including matrix uncertainty, source distribution, gamma and neutron interferences (α, n), calibration, self-shielding, and isotopics. All aspects of TMU for both the SGS and passive and active modes of the IPAN were technically adequate and appropriately documented. There are no issues with the determination and documentation of TMU for the DWAS IPAN/SGS system.

- (4) The LLD, including the minimum detectable concentration of the DWAS IPAN/SGS system, had been determined and documented, following revision of one ORNL-CCP report.

The LLD definition used by ORNL-CCP is consistent with that specified in DOE/WIPP-02-3122 (CH WAC). Specifically, the LLD is defined 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 a function of the type of measurement, the measurement (data acquisition) time, the properties of the waste matrix being assayed, and the environmental background. For this reason, the LLD will vary from drum to drum and may even vary between measurements of the same drum.

The DWAS IPAN/SGS system reports an LLD for each of the 10 WIPP-tracked radionuclides for the gamma (SGS) and both passive and active neutron (IPAN) operational modes. Only measured values that exceed the reported LLD for that measurement will be reported and used in calculations of derived quantities, such as total TRU alpha activity and TRU alpha activity concentration. The LLD values for the SGS component of the DWAS IPAN/SGS system are documented in MV-SGS0101-CAL-001, *Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report*, Revision 0, November 6, 2007. This document contains empirically determined LLDs for the sum of segments and summed spectrum modes, Tables 5 and 6, respectively. Table 6 lists reporting the sum of segments reporting thresholds for radionuclides that are not directly measured, specifically ^{238}Pu , ^{240}Pu , ^{242}Pu , and ^{90}Sr . Based on Section 6.0 of MV-SGS0101-CAL-001, a unique reporting threshold for ^{234}U is not provided based on ORNL-CCP’s contention that it is not technically feasible to determine a unique reporting threshold for ^{234}U . Section 5.0 of MV-SGS0101-CAL-001 also states that it is possible to use the SGS to quantify wastes at levels below 100 nCi/g (i.e., the measurement criterion for TRU wastes). However, ORNL-CCP personnel stated that the SGS will not be used to discriminate TRU and non-TRU waste criterion.

The LLD values for the passive and active modes of the IPAN are documented in BII-5183-CVR-001. The active mode LLD has been determined to be less than 100 nCi/g over this mode's entire calibration (ABSMOD) range. The passive mode LLD is expressed in terms of grams of $^{240}\text{Pu}_{\text{EFF}}$, which is technically appropriate since this mode is used for higher gram value assays such that there is no expectation that the passive mode would be used to sort wastes at the 100 nCi/g TRU criterion. BII-5183-CVR-001 did not address the LLD determination for all of the 10 WIPP-tracked radionuclides. EPA discussed this concern with ORNL-CCP NDA personnel and included it on an EPA Inspection Issue Tracking Form (see Attachment C.6 of this report for a copy of this form). This concern is discussed below.

EPA Inspection Issue Tracking Form, Issue No. ORNL-CCP-CH-NDA-07-006CR, Final:

The calibration report for the DWAS IPAN NDA system BII-5183-CVR-001, Revision 2, Section 5.4, Table 12, "LLD Implementation," does not address the LLD determination for two of the 10 WIPP-tracked radionuclides, ^{234}U and ^{90}Sr . The report is silent regarding the LLD determination for these two radionuclides. The SGS calibration report appropriately addresses the LLD determinations for ^{234}U and ^{90}Sr .

Resolution: ORNL-CCP personnel provided an electronic copy of Revision 3 of BII-5183-CVR-001, dated November 2007. Section 5.4, page 24, was modified to address the LLD determination for both ^{234}U and ^{90}Sr . Table 12 was not changed, but text was added below the table that explained the exclusion of these radionuclides from Table 12 and presented the approaches used for both radionuclides.

Status of Concern: ORNL-CCP's revision adequately addressed EPA's concern, and this concern is closed.

There are no issues with the determination and documentation of the LLD for the DWAS IPAN/SGS system.

(5) ORNL-CCP had registered the DWAS IPAN/SGS to participate in the CBFO-sponsored PDP, as required.

The DWAS IPAN/SGS was registered to participate in Cycle 14B of the CBFO-sponsored NDA PDP. This cycle had a start date of October 22, 2007, and data for the DWAS IPAN/SGS will be provided upon completion of the assays and data evaluation. Objective evidence that documented ORNL-CCP's PDP participation was provided to and reviewed by the EPA inspection team.

(6) EPA replicate testing of the DWAS IPAN/SGS unit was performed and evaluated, and was found to comply with the criteria for the EPA Replicate Testing Protocol.

The purpose of the replicate testing performed as part of this inspection is to provide EPA with an independent means to verify that the DWAS IPAN/SGS unit can provide reproducible results for the determination of the quantity of 10 WIPP-tracked radionuclides (^{241}Am , ^{137}Cs , ^{238}Pu ,

²³⁹Pu, ²⁴⁰Pu, ²⁴²Pu, ⁹⁰Sr, ²³³U, ²³⁴U, and ²³⁸U) and the TRU alpha concentration.⁷ This is accomplished by reassaying drums previously measured on the same system in order to demonstrate the system's ability to do the following:

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

As part of the inspection to evaluate the DWAS IPAN/SGS unit, EPA requested that the DWAS IPAN/SGS unit reassay three drums that EPA randomly selected from a list of previously assayed drums. EPA chose containers X10C0501112, X10C0505990, and X10C0501270. All three drums were reassayed on the DWAS IPAN/SGS unit five times, and the data for the five replicates and the original assay were analyzed using two statistical tests, a chi-squared (χ^2) test and a t-test. The EPA inspection team observed operation of the DWAS IPAN/SGS unit as it performed the assay of container X10C0501270. Attachments B.1–B.6 include data and results of the statistical analysis for all three assays.

The t-test for all three containers assayed on the DWAS IPAN/SGS did not show any statistically significant differences between the original measurement assay values and the average of the five replicate measurements for the activities of any of the target radionuclides or the TRU alpha activity concentration. The χ^2 test for all containers assayed on the DWAS IPAN/SGS showed that the observed variances in the replicate measurements are less than or equal to the reported uncertainties within the statistical limits of the test. There are no technical issues associated with replicate testing of the DWAS IPAN/SGS.

Summary of NDA Findings and Concerns

The EPA inspection team did not identify any findings related to NDA during this inspection. EPA did identify two concerns, one related to the SGS calibration report, and one related to LLD determination of the DWAS IPAN system, both of which are discussed in the preceding section. Attachments C.2 and C.6 of this report provide the two EPA Inspection Issue Tracking Forms documenting these issues. EPA considers both concerns to have been adequately addressed, and there are no open concerns related to NDA at ORNL-CCP resulting from this inspection.

Baseline Approval

The baseline conditions that the EPA inspection team evaluated during this inspection consist of the DWAS IPAN/SGS NDA system currently located in Building 7880-I of the TWPC for gamma and neutron-based assays of CH retrievably-stored debris (S5000) wastes in 55-gallon drums, as described above and detailed in the DWAS IPAN/SGS Checklist (Attachment A.2 to

⁷ Revision 2 of the EPA Replicate Testing Protocol provides the details of the replicate testing assay protocol and data evaluation.

this report), over the system's operational ranges for gamma and neutron-based assays. The approved operational ranges for the DWAS IPAN/SGS NDA are as follows:

- For gamma assays using the SGS component, the operational range is from the system's LLD to 45 g total plutonium in terms of activity; and from 0 to 0.72 g/cm³ in terms of waste matrix.
- For passive mode neutron assays, the operational range is from the system's passive mode LLD to 2.050 g ²⁴⁰Pu_{EFF} in terms of activity; and a MOD index range from 1.045 to 17.572 in terms of matrix.
- For active mode neutron assays, the operational range is the system's active mode LLD to 14.710 g ²³⁹Pu_{EFF} in terms of activity, and an ABSMOD index range from 22.251 to 176.800 in terms of matrix.

EPA is approving the DWAS IPAN/SGS NDA 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 DWAS IPAN/SGS checklist (Attachment A.2). This is discussed in the following section.

NDA Tiers

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

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

- New NDA equipment other than the DWAS IPAN/SGS system⁸
- Physical modifications to the DWAS IPAN/SGS NDA system approved⁹
- Extension or changes of the approved calibration range(s) for the DWAS IPAN/SGS system

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

⁸ New NDA equipment refers to a system or component not previously evaluated by EPA at ORNL-CCP. 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 EPA has not formally inspected and approved, is a new system and EPA must approve it prior to its implementation to characterize WIPP wastes.

⁹ Physical modification to the DWAS IPAN/SGS system includes all changes and/or modifications to this system 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.

- 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 neutron measurements from 0.36 g to 30.1 g ²⁴⁰Pu_{EFF} may operate in a subset of this range. This typically occurs when a system is calibrated for material control and accountability (MC&A) measurements as well as for WIPP assays, as is the case with many NDA systems used for TRU assays. 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 0.72 g/cm³ for the DWAS SGS component or an ABSMOD index range of 22.251 to 276.800 for the active neutron mode of the DWAS IPAN, discussed earlier in this report. This range may include materials that are commonly referred to using terms such as “debris (S5000),” which is within the calibrated density range and would be expected to be within the ABSMOD range. Actual waste assays may be restricted to a portion or subset of this range for a variety of technical and/or administrative reasons. Changing the calibrated range by extending the density range beyond 0.72 g/cm³ for the DWAS SGS unit, the MOD range beyond 1.045 to 17.572, or the ABSMOD range beyond 22.251 to 276.800 for the DWAS IPAN unit is a T1 change. Provided the original approved density range is valid, changing the operational range(s) of an approved NDA system—that is, decreasing it relative to the originally approved range—is a T2 change, as discussed below.

ORNL-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, CBFO should assume that an EPA inspection is likely. In the case of the last T1 NDA change, EPA will inform ORNL-CCP and CBFO whether a site inspection is necessary. EPA may request additional information, choose to conduct a desktop review, and/or confer with ORNL-CCP NDA personnel. Upon evaluation (with or without site inspection), EPA will issue an approval letter. Only upon receiving the EPA approval can ORNL-CCP continue to use the equipment affected by the change.

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

- Changes to software for the DWAS IPAN/SGS system
- Changes to the approved operating range(s) for either the SGS or IPAN operating range(s) (see discussion above)
- Changes to procedures that address the DWAS IPAN/SGS system's calibration and/or operation that require CBFO approval

Examples of changes to software would include the following:

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

Regarding changes to the approved operating ranges, reducing a system's operating range because of performance-related problems or equipment failure would be a T2 change. For example, if the DWAS failed to pass a PDP cycle for a specific matrix or activity range and ORNL-CCP or CBFO formally restricted its use as a result of those, this would be a T2 change.

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

8.3 Real-Time Radiography

WC Element Description

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

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

- Training of RTR personnel

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

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

ORNL-CCP has one RTR unit that can only be used to examine 55-gallon drums. Consequently, any standard waste boxes (SWBs) or other larger containers in Waste Stream OR-NFS-CH-HET must be repackaged into drums prior to RTR examination.

Documents Reviewed

The checklist in Attachment A.3 in conjunction with the listing below provides the documents that were examined to evaluate the ORNL-CCP RTR operations:

- CCP-TP-028, CCP Radiographic Test and Training Drum Requirements, Revision 3, January 19, 2006
- Attachment 1, CCP NDE Test Drum Inventory Sheet for Training Drums ORNL-NDE-Test-001 and ORNL-NDE-Test-002, to CCP-TP-028, CCP Radiographic Test and Training Drum Requirements, Revision 3, January 19, 2006
- CCP-QP-002, CCP Training and Qualification Plan, Revision 25, May 8, 2007
- CCP-TP-053, CCP Standard Real-Time Radiography (RTR) Inspection Procedure, Revision 5, November 16, 2006
- CCP-TP-001, CCP Project Level Data Validation and Verification, Revision 17, September 24, 2007
- CCP-PO-001, CCP Transuranic Waste Characterization Quality Assurance Project Plan, Revision 15, August 10, 2007
- CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19, May 22, 2007

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

- RTR BDRs: OR-RTR6-001, OR-RTR6-003, OR-RTR6-007 (S5000 debris waste)
- Audio/visual recording of RTR events for drums from the above BDRs
- Written record of the initial capability demonstration for drum RTR operators, September 2007
- Capability demonstration audio/visual recordings for selected operators

- CCP-TP-053, Attachment 1, CCP RTR Measurement Control Reports, for all seven completed RTR BDRs
- NCR-ORNL-0101-07 and NCR-ORNL-0500-07
- CCP Standing Order CCP-SO-011, Revision 4, November 1, 2007
- CCP/ORNL 2007 NCR Log
- CCP-TP-001, Attachment 2, CCP SPM Radiography Project Level Validation Checklist and Summary for BDRs OR-RTR6-001, OR-RTR6-003, OR-RTR6-007
- CCP-TP-053, Attachment 2, CCP Radiography Data Sheet, for demonstration drum X10C0501308

Technical Evaluation

During the inspection, the following technical elements of the RTR process were investigated:

- (1) Overall procedural technical adequacy and implementation were investigated and were found to be acceptable.

EPA reviewed the RTR procedure, CCP-TP-053, and determined that it was technically adequate. The procedure contained specific information on performing nonintrusive radiography, including operational setup and check out, identification of prohibited items, assignment of WMPs and estimation of weights and volumes, confirmation of WMCs, input of data, and issuance of NCRs. Technical and project level review of radiography results is performed in accordance with procedures CCP-TP-053, Attachment 3 and CCP-TP-001, Attachment 2. Standing Order CCP-SO-011 requires that the Independent Technical Reviewer (ITR) perform a review on 100% of the audio/visual recording for the drums processed. EPA verified that each BDR contained an ITR and SPM checklist. During the onsite inspection, EPA observed the RTR event for X10C0501308, a S5000 debris drum. EPA also reviewed the previously generated written BDR and the audio/visual recordings for selected drums and determined that procedure CCP-TP-053 was implemented as written.

Notification to EPA upon the implementation of new RTR equipment or substantive changes to the approved RTR equipment is a T2 change. (See Table 1, which includes this as a T2 change.)

- (2) Characterization of WMPs and prohibited items was investigated and was found to be adequate following modifications to ORNL-CCP documents.

The RTR procedure requires that the radiography audio/visual recording equipment be verified at the beginning of every shift. Verification is achieved by viewing a lines-pair resolution test gauge and ensuring that the visible image meets the minimum requirement. Adherence to verification requirements was confirmed by interviewing RTR operators; reviewing measurement control reports for BDRs OR-RTR6-001 through OR-RTR6-007; and reviewing video/audio recordings for BDRs OR-RTR6-001, OR-RTR6-003, and OR-RTR6-007. The RTR operators demonstrating the RTR procedure had a hard copy of the waste stream description for the waste stream being processed available for review. The RTR operators were able to explain

how they answered questions on the RTR data sheet with regard to waste stream description and WMC.

For each container undergoing examination, an audio/video recording of the RTR event is made. During the onsite inspection, EPA observed the RTR event for drum X10C0501308, a S5000 debris waste container. The first notations made on the audio/video recording by the operator were the operator's name, the drum number, and the date and time. The examination began at the top drum lid, where the operator identified the presence or absence of a drum liner. The drum was rotated through 360 degrees, so that all objects were viewed from all sides. The operator then moved down the drum in set increments, zooming in and out and increasing or decreasing the scan energy to compensate for varying densities in the material examined. During the RTR examination, the operator also jogged the drum to determine the presence of free liquids. "Jogging" the drum is abruptly changing the direction of the rotation to make the drum's contents move, a useful technique to cause free liquids within the drum to splash, thereby enabling the RTR operator to acknowledge their presence.

The RTR operator identified WMPs associated with the container being examined, and a second RTR operator electronically entered the data into an RTR data sheet. At the end of the examination, the operator estimated the weight of each recorded WMP and ensured that the total WMP weight matched the weight value obtained by actually weighing the container. Most weight values that were recorded were estimates, although Table 3 of the RTR procedure contains historically derived weights for some common items. The absence of prohibited items was recorded on the data sheet. EPA further verified this by reviewing previously recorded written and audio/visual records. The operator recording the RTR data opened templates for Attachment 1, *CCP RTR Measurement Control Report*, and Attachment 2, *CCP Radiography Data Sheet*, during the demonstration. Both of the templates had fields already completed; using the Reset function for Attachment 2 did not clear the existing information from these fields. The EPA inspection team member discussed this with ORNL-CCP RTR personnel, and EPA included it on an EPA Inspection Issue Tracking Form (see Attachment C.1 of this report for a copy of this form). This concern is discussed below.

EPA Inspection Issue Tracking Form, Issue No. ORNL-CCP-CH-RTR-001CR: When the templates used to complete Attachments 1 and 2 of CCP-TP-053 were opened during the onsite RTR demonstration, answers were already present on the attachments for some of the questions. Examples include the following:

- Attachment 1 had check marks indicating "SAT" (satisfactory) for the questions for "Video/Audio Recorded Media System Check" and "Image Test Pattern Test."
- The entries indicating the number of lines-pair/centimeter had already been filled in to indicate "25."
- Section 3 of Attachment 2 contained entries for "horsetail" and "plastic," and the question "NCR(s) associated with the container?" was checked "No."

Even when the form was reset, the check marks did not disappear.

Resolution: ORNL-CCP cleared Attachments 1 and 2 of all filled-in information, and these attachments were formatted so that they do not contain any information filled in upon opening. The ORNL-CCP resident Quality Assurance Engineer verified these actions on November 14, 2007. ORNL-CCP procedure CCP-PO-005, *Conduct of Operations*, was revised to provide specific guidance for the development and use of fillable forms. ORNL-CCP training in lessons learned was developed and distributed to all ORNL-CCP operators, Vendor Project Managers, SPMs, and Waste Certification Officials (WCOs).

Status of Concern: The response is complete and adequate. EPA accepts the resolution and considers the issue closed.

Notification to EPA upon the completion of changes to CCP-TP-001, CCP-TP-028, CCP-TP-053 or other ORNL-CCP RTR procedures that require CBFO approval is a T2 change. (See Table 1, which includes this as a T2 change.)

(3) Documentation of radiography activities was examined and was found to be adequate.

Simultaneous audio descriptions and video recordings are made as the waste is examined. These data are also recorded on the electronic data sheets, and hard copies of the examinations are provided in the BDRs. The EPA inspector verified this during the onsite inspection by observing the examination of one waste container (X10C0501308 from RTR BRD OR-RTR6-0013) and further verified it by reviewing selected RTR BDRs in conjunction with the following audio/visual recordings:

- OR-RTR6-001, drum X10C0501101 (S5000)
- OR-RTR6-003, drum X10C0501391 (S5000)
- OR-RTR6-007, drum X10C0501179 (S5000)

In all cases, the information on the audio/visual recording matched the written RTR record in the BDR.

(4) Documentation of radiography procedures was assessed and was found to be adequate.

Radiography procedures are well defined, and the documents are controlled. During the inspection, the EPA inspection team reviewed the adequacy and implementation of all current radiography-related procedures. Quality control (QC) examinations were performed as required by the procedure. In BDR OR-RTR6-001, an independent observation was performed on container X10C0501146, and a replicate scan was performed on container X10C0501144. In BDR OR-RTR6-003, an independent observation was performed on container X10C0505973, and a replicate scan was performed on container X10C0506048. In BDR OR-RTR6-007, an independent observation was performed on container X10C0501407, and a replicate scan was performed on container X10C0501270. As required, different operators performed the analyses of the original and the QC replicate samples. Reconciliation of the QC results is only required if there is a difference between operators with regard to the WMC, liquids, and compressed gases, as specified in CCP-TP-053, Sections 4.5.3 and 4.6.3. EPA discussed this with RTR personnel

and included it on an EPA Inspection Issue Tracking Form (see Attachment C.5 of this report for a copy of this form). This concern is discussed below.

EPA Inspection Issue Tracking Form, Issue No. ORNL-CCP-CH-RTR-005C: The replicate and original scans that were performed in batch OR-RTR6-0003, container X10C0506048, had a 15% difference in the percent fill factor as well as minor differences in the recorded WMP weights. CCP-TP-053 only requires reconciliation of discrepancies when “identification of the WMC, liquids in excess of TSDF-WAC limits and compressed gases differ between the two operators.” The same situation applies to the independent and original observations. While this practice complies with the requirements of CCP-TP-053, Sections 4.5.3 and 4.6.3, it does not satisfy EPA’s requirement for a system of controls demonstrating consistent and accurate identification of waste attributes. A tolerance needs to be defined for waste attributes.

Resolution: EPA did not require a response to this concern.

Status of Concern: This issue is closed.

NCRs are generated as needed. For example, NCR-ORNL-0101-07 was initiated for drum X10C0501150 because the audio track was missing on the DVD that was generated during the container’s examination. NCR-ORNL-0500-07 was initiated for container X10C0501123 because the container’s waste did not match the waste stream description.

The BDRs that EPA inspection team evaluated during the inspection had been reviewed at the data generation and project levels, and had been approved by the ITR and SPM, respectively, as required, and the completed review checklists were contained in the BDRs.

(5) Training of radiography personnel was adequate.

During the inspection, EPA reviewed the records of the capability demonstration for selected radiography personnel. The audio/visual recordings for the latest capability demonstration container for the drum RTR operator/ITRs were viewed during the inspection. Training records reviewed indicated that only trained personnel were operating the RTR equipment. The records reviewed included the following:

- Radiography data sheet for capability demonstration for the four qualified RTR operators/ITRs, dated September 26, 2007, or October 1, 2007
- Audio/visual recording of drum RTR capability demonstration for the four operators/ITRs, dated September 26, 2007, or October 1, 2007
- Inventory for training drums, ORNL-NDE-TEST-001 and ORNL-NDE-TEST-002

The operator/ITRs successfully identified all of the prohibited items contained in the training drum. However, the operators/ITRs consistently demonstrated that they were unable to identify all of the unknown items in the drum, including cardboard and a plastic measuring cylinder. EPA discussed this with RTR personnel and included it on an EPA Inspection Issue Tracking

Form (see Attachment C.4 of this report for a copy of this form). This concern is discussed below.

EPA Inspection Issue Tracking Form, Issue No. ORNL-CCP-CH-RTR-004C: The EPA inspector noted that while all RTR operators correctly identified all of the required prohibited items in the capability demonstration training containers, they did not identify some additional items, specifically cellulose and plastic. All cellulose and plastics in the training drum need to be identified and their identification documented. To complete the training process, it is critical that the operator receives feedback regarding missed items. More detailed documentation of the feedback given is needed when the results of the training drum are reviewed.

Resolution: EPA did not require a response to this concern.

Status of Concern: This issue is closed.

Summary of RTR Findings and Concerns

The EPA inspection team did not identify any findings in the area of RTR during this baseline inspection. The EPA inspection team did identify three concerns in the area of RTR that are discussed above. Attachments C.1, C.4, and C. 5 of this report provide a copy of each of the EPA Inspection Issue Tracking Forms documenting these issues. EPA considers all three concerns to have been adequately addressed, and there are no open concerns related to RTR at ORNL-CCP resulting from this inspection.

Baseline Approval

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

- Trained personnel: Drum RTR operators/ITR and SPM
- Approved and controlled operating procedures: CCP-TP-053, Revision 5; CCP-QP-002, Revision 25; CCP-TP-028, Revision 3; and CCP-TP-001, Revision 17
- Drum RTR unit for S5000 (debris) wastes
- RTR records and supporting data: RTR electronic data recording forms, ITR and SPM review checklists, and RTR BDRs

The drum RTR system is suitable for S5000 (debris) wastes.

RTR Tiers

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

T1 RTR changes require EPA review and approval prior to implementation. There are no T1 RTR changes at this time.

T2 RTR changes that do not require EPA approval prior to implementation but require reporting and submission of documentation discussing changes by ORNL-CCP include the following:

- New RTR equipment or substantive changes to approved RTR equipment
- Changes made to ORNL-CCP RTR procedure(s) that require CBFO approval

Every 3 months from the date of EPA approval, ORNL-CCP will provide information concerning T2 changes. If new RTR equipment is in use, an EPA inspection may be necessary. EPA will evaluate changes and communicate with ORNL-CCP whether the changes raise any concerns and require a response from ORNL-CCP, or whether ORNL-CCP can continue to implement the changes.

8.4 WIPP Waste Information System

WC Element Description

At the time of the onsite inspection, ORNL-CCP had not entered either characterization or certification data into the WWIS for ORNL containers. However, ORNL-CCP has successfully submitted WC/waste certification data for numerous containers to the WWIS in the past (see Air Docket A-98-49, II-A4-65). Procedure CCP-TP-030, *CCP TRU Waste Certification and WWIS Data Entry*, is used to guide submittal of both characterization and certification data to the WWIS.

Documents Reviewed

The checklist in Attachment A.4 in conjunction with the listing below provides the documents that were examined to evaluate ORNL-CCP WWIS operations relative to the requirements of CCP-TP-030, Revision 22, July 24, 2007:

- Waste Certification Assistant (WCA) Qualification Card (**not** qualified for ORNL)
- WCO Qualification Card (**not** qualified for ORNL)
- WCO Qualification Card (qualified for ORNL)
- List of Valid Emplacement Assembly Configurations
- MS Excel 2000 and XP WWIS Spreadsheet for Container LA00000062113
- Waste Container Data Report, Container LA00000062113
- MS Excel 2000 and XP WWIS Spreadsheet for Container 10086822
- Waste Container Data Report, Container 10086822
- NCR-INL-0501-07
- List of Qualified WCOs and WCAs

Technical Evaluation

(1) Overall procedural technical adequacy was evaluated and found to be adequate.

The WWIS procedure, documented in CCP-TP-030, is well defined, controlled, and contains complete instructions for entering, reviewing, and transmitting data. Adequate reviews are incorporated into the WWIS data entry procedure to minimize the transmittal of noncompliant or incorrect data. No adequacy issues were identified for this procedure.

Providing notification to EPA upon completion of changes to CCP-TP-030 and other WWIS procedure(s) requiring CBFO approval is a T2 change. Consistent with EPA's authority under 40 CFR 194.24(h), the Agency may request this information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1, which includes this as a T2 change.)

(2) Implementation and documentation of WWIS activities were examined and found to be adequate.

Personnel entering data into the WWIS can only do so after being granted access by the WWIS Administrator, and access is password protected. EPA observed manual entry of data for containers 10086822 and LA00000062113. At the time of the onsite inspection, the WWIS was not configured to accept data from ORNL-CCP, and the demonstration used container data from other CCP sites. The demonstration consisted of changing data for containers 10086822 and LA00000062113 to verify that the WWIS rejects containers that are not WIPP compliant. Both compliant and noncompliant versions of the container data were submitted to the test instance of the WWIS. The WWIS rejected the containers with noncompliant data as required and provided information as to the reason for the rejection. Containers that have open NCRs associated with them are identified during the data reconciliation process and do not progress to data entry until all NCRs are closed. After data entry, the data are reviewed and, if they are acceptable, they are sent to a WCO for review. Only after resolution of any discrepancies are the data transmitted to the WWIS. Data storage and retrieval were demonstrated. ORNL-CCP was able to retrieve and print requested records, including waste container data reports and Microsoft Excel spreadsheets. Although the WWIS process was demonstrated during the onsite inspection, EPA was not able to observe data entry for ORNL-CCP data by an ORNL-CCP qualified WCO. EPA may choose to review the ORNL-CCP WWIS process at a later date.

(3) The training of WWIS personnel was reviewed and was found to be adequate.

WWIS WCA and WCO personnel are based in Carlsbad, New Mexico, where all data entry takes place. At the time of the onsite inspection, ORNL-CCP had only one WCO qualified for ORNL-CCP data entry, and the WCO who demonstrated the WWIS process for the EPA inspection team was not this individual. EPA observed data entry by a WCO from a different CCP site for the purpose of verifying training and qualification.

ORNL-CCP WWIS personnel receive general WWIS training plus training specific for each CCP site. The training records for the WCA and WCO individuals that the EPA inspection team interviewed were reviewed to ensure that the records were complete. Training included use of

the WWIS User's Manual, site-specific training, the Transuranic Waste Characterization Quality Assurance Project Plan, and the Transuranic Waste Certification Plan. All training for these individuals was appropriately documented, and their training records were complete and available for inspection.

(4) Load management was evaluated and was found to not apply at ORNL-CCP at this time.

At the time of the onsite inspection, ORNL-CCP is not seeking approval to perform load management, and EPA excluded evaluation of load management from the scope of this baseline inspection. The implementation of load management for CH TRU wastes at ORNL-CCP is a T1 change. (See Table 1, which lists this as a T1 change.)

Summary of WWIS Findings and Concerns

The EPA inspection team did not identify any findings or concerns in the area of the WWIS during this baseline inspection. There are no open concerns related to the WWIS at ORNL-CCP resulting from this inspection.

Baseline Approval

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

- Trained WWIS WCAs and WCOs
- Approved and controlled operating procedure: CCP-TP-030, Revision 22

WWIS Tiers

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

T1 WWIS changes that require EPA review and approval prior to implementation include the following:

- Addition of load management for CH TRU containers at ORNL-CCP

ORNL-CCP will report and submit documentation for T1 changes when it is ready for EPA review. Upon initial review, EPA will inform ORNL-CCP and CBFO whether a site inspection is necessary. EPA may request additional information, choose to conduct a desktop review, and/or confer with ORNL-CCP WWIS personnel. Upon evaluation (with or without site inspection), EPA will issue an approval letter. Only upon receiving the EPA approval can ORNL-CCP implement the load management or any other activity deemed to be a T1 change for WIPP wastes.

T2 WWIS changes that do not require EPA approval prior to implementation but that require reporting and submitting documentation include the following:

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

Every 3 months from the date of EPA approval, ORNL-CCP will provide information concerning T2 changes. EPA will evaluate changes and communicate with ORNL-CCP whether the changes raise any concerns and require ORNL-CCP response, or whether ORNL-CCP can continue to implement the changes.

8.5 Container Management

ORNL-CCP manages containers of CH TRU waste in accordance with procedure CCP-TP-068, *CCP Container Management at the Idaho Laboratory (INL) and TRU Waste Processing Center*, Revision 5, September 20, 2007. EPA inspectors evaluated ORNL-CCP's container management process to verify that adequate controls are in place to ensure that any container selected for disposal at the WIPP has gone through all WC components and is duly certified for shipment to the WIPP. An overview of container processing at ORNL is provided below:

- Incoming containers of CH TRU waste are processed in accordance with CCP-TP-068. ORNL-CCP verifies that containers are listed in the AK Tracking Spreadsheet, inspects and weighs the containers, and attaches a traveler, either an affixed label or a paper copy, to each accepted container.
- Containers are subjected to NDE. If a prohibited item is identified, an NCR is initiated and the container is returned to Energx for remediation. After successful removal of the prohibited item, the container is returned to ORNL-CCP for continued characterization.
- Containers undergo NDA. An NCR is initiated if the TRU alpha activity of the container is less than 100 nCi/g and the container is returned to Energx.
- After the drum aging criteria (DAC) have been met, headspace and/or flammable gas analysis is performed, as necessary.
- Fissile Gram Equivalent (FGE) is determined.
- Containers are stored until shipment to the WIPP.

Energx owns the containers and is responsible for performing container safety checks prior to transferring them to the ORNL-CCP CH storage area. Energx personnel are responsible for physically moving containers on the site. At no time does ORNL-CCP own the containers processed. After receipt, the ORNL-CCP Container Manager initiates procedure CCP-TP-068, and a container inspection is performed and documented using Attachment 2. If the container fails the inspection, ORNL-CCP returns it to Energx. A traveler (Attachment 1) is attached to those containers that pass inspection, and all characterization activities performed on containers from this point forward are recorded on the traveler. Each container is weighed, and weights are recorded on Attachment 3.

The ORNL-CCP Vendor Project Manager (VPM) receives a list of containers that have been through integrity checks and informs Energx container management personnel which containers need to be moved to NDE on that day. The NDE equipment is located in the CHSA. Upon

completion of NDA, containers are moved to the DAC storage areas, which are cargo containers located close to the CHSA. Headspace and/or flammable gas analysis takes place in Room 122. It is anticipated that the CHMB will be completed in December 2007. Upon completion, the containers presently stored in the DAC containers will be moved to CHMB to await shipment to the WIPP. ORNL-CCP does not know what containers are in each area at any one time because Energx is responsible for tracking the containers.

Rejected containers are returned to Energx. The Energx Waste Operation Leader receives a verbal communication from ORNL-CCP that containers are rejected. Energx also receives a copy of the ORNL-CCP NCR to assist Energx in container disposition. ORNL-CCP receives only 55-gallon drums. Some of this waste stream is in SWBs, and these are processed by Energx and repackaged into 55-gallon drums.

Energx is responsible for shipping containers to the WIPP. ORNL-CCP's WCO will enter data into the WWIS for container certification. The Transportation Certification Official (TCO) will build a payload and provide this to Energx. Load management will not be used for these containers. ORNL-CCP loaders will place the containers into the TRUPACTs for transportation to the WIPP.

Although EPA was not able to observe all phases of this process, the ORNL-CCP procedure adequately addressed all phases of container management.

9.0 RESPONSE TO COMMENTS

EPA did not receive any comments on the proposed approval.

10.0 SUMMARY OF RESULTS

10.1 Findings and Concerns

The concerns identified during the inspection, as well as ORNL-CCP responses, are discussed in the preceding sections of this report. Attachment C includes copies of the EPA Inspection Issue Tracking Forms that capture these issues.

As stated previously in this report, EPA Concern No. ORNL-CCP-CH-CBFO-003F, Final, was not addressed as part of the ORNL-CCP baseline inspection process. Due to the nature of the concern, the fact that it occurred in conjunction with this inspection is coincidental and does not reflect on the technical adequacy of the ORNL-CCP WC program. CBFO, in a letter dated December 21, 2007, provided a commitment to EPA to prevent recurrence of the issues in the finding. EPA accepts the CBFO response and considers this issue to be closed.

ORNL-CCP responded to the other eight EPA concerns that required a response prior to the inspection closeout on site as well as 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 the baseline inspection of ORNL-CCP remain open at this time.

10.2 Conclusions

The EPA inspection team determined that the ORNL-CCP WC program activities were technically adequate. EPA is proposing to approve the ORNL-CCP WC program in the configuration observed during this inspection and described in this report and the attached checklists (Attachments A.1 through A.4). This approval includes the following:

- (1) The AK process for retrievably-stored CH TRU debris wastes
- (2) The DWAS IPAN/SGS system for assaying CH TRU wastes
- (3) The NDE process of RTR for CH TRU debris wastes
- (4) The WWIS process for tracking of waste contents of CH TRU wastes

This baseline approval of ORNL-CCP does not include load management.

ORNL-CCP must report and receive EPA approval of any T1 changes to the ORNL-CCP WC activities from the date of the baseline inspection. It must notify EPA regarding T2 changes according to Table 8, below. (See Section 2.0 of this report for a brief discussion of tiering.) Table 8 closely follows the format used in the two previous CH baseline approval reports of Hanford and the LANL-CCP (see EPA Docket Nos. A-98-49, II-A4-93; and A-98-49, II-A4-88, respectively). All T1 changes must be submitted for evaluation and approval by EPA prior to their implementation. Upon approval, EPA will post the results of the evaluations to the EPA Web site and by sending e-mails to 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 ORNL-CCP's T2 changes at the end of the first quarter following approval.

The scope of the site baseline compliance decision is based on EPA's inspection completed November 13–15, 2007.

**Table 8. Tiering of TRU WC Processes Implemented by ORNL
Based on November 13–15, 2007, Onsite Baseline Inspection**

WC Process Elements	ORNL-CCP WC T1 Changes	ORNL-CCP WC T2 Changes ^a
Acceptable Knowledge (AK) and Load Management	Implementation of load management; AK (5) Implementation of AK for wastes other than retrievably-stored debris (i.e., retrievably stored soil/gravel and solids and/or any type of newly-generated waste); AK (15)	Notification to EPA upon completion of AK accuracy reports; AK (2) Notification to EPA upon completion of new versions or updates/substantive changes ^b of the following: <ul style="list-style-type: none"> - Changes to AK-NDA communications and memoranda; AK (3) - Changes to site procedure; AK (4) - AK Summaries that describe wastes beyond the 144 containers described in this report; AK (6) - Radiological Discrepancy Resolution Reports (AK-AK and AK-NDA) pertinent to Waste Stream OR-NFS-CH-HET; AK (11) - Completed Attachments 4 and 6 and associated memoranda for Waste Stream OR-NFS-CH-HET; AK (10) and (14) - AK Summaries/Waste Stream Profile Forms (WSPFs) and AK documentation reports; AK (15)
Non Destructive Assay (NDA)	New equipment or physical modifications to approved equipment ^c ; 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: <ul style="list-style-type: none"> - Implementation of new RTR equipment or substantive changes^b to approved RTR equipment; RTR (1) - Completion of changes to site RTR procedures requiring CBFO approvals; RTR (2)
Visual Examination (VE)	Not approved at this time	Not approved at this time
WIPP waste Information System (WWIS)	Implementation of load management; WWIS (4)	Notification to EPA upon the following: <ul style="list-style-type: none"> - Completion of changes to WWIS procedure(s) requiring CBFO approvals; WWIS (1)

^aUpon receiving EPA approval, ORNL-CCP will report all T2 changes to EPA at the end of each fiscal quarter.

^b“Substantive changes” means changes with the potential to impact the site’s WC activities or documentation thereof, excluding changes that are solely related to ES&H, nuclear safety, or RCRA, or that are editorial in nature.

^cModifications 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, 2004.

U.S. Department of Energy, “Transuranic Waste Baseline Inventory Report,” Revision 0, DOE/TRU-2206-3344.

U.S. Department of Energy, Carlsbad Area Field Office, “Contact-Handled Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant (CH-WAC),” Revision 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, Revision 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,” Revision 2, June 2002.

U.S. Nuclear Regulatory Commission, “Contact-Handled Transuranic Waste Authorized Methods for Payload Control.”

ATTACHMENT A.1: ACCEPTABLE KNOWLEDGE (AK) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

Inspection Date: November 13-15, 2007

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
GENERAL			
AK-1: Is the waste TRU by definition as presented in the LWA? (P.L.102-579)	CCP-TP-005, Revision 18; Section 4.4.31; CH-WAC Revision 3; P.L. 102-579	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	CCP-AK-ORNL-001 Revisions 0 and 1. Load Management will not be performed; The implementation of Load management is a T1 change.
AK-2: Do the presented volumes comport with LWA capacity restrictions? (P.L.102-579)	CCP-TP-005, Revision 18; CH-WAC Revision 3; P.L. 102-579	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	CP-AK-001 Revisions 0 and 1, M012. Available data indicate that assessed waste stream is within the LWA capacity envelope.
AK-3: Are any wastes considered (or previously considered) high level wastes (HLW)? HLW are prohibited. (P.L.102-579)	CCP-TP-005, Revision 18; CH-WAC Revision 3; P.L. 102-579	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	CCP-AK-ORNL-001 Revisions 0 and 1. HLW are not present in the waste stream examined during this inspection.
AK-4: Are any wastes considered (or previously considered) Spent Nuclear Fuel? (P.L.102-579)	CCP-TP-005, Revision 18; CH-WAC Revision 3; P.L. 102-579	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	CCP-AK-ORNL-001 Revisions 0 and 1, P273. CCP representatives indicate that no SNL are in examined waste stream.
AK-5: Are these defense wastes? (P.L.102-579)	CCP-TP-005, Revision 18; CH-WAC Revision 3; P.L. 102-579	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	CCP-AK-ORNL-001 Revisions 0 and 1, M021, C099, C100
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 18; CH-WAC Revision 3; P.L. 102-579, CRA 2004	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	CCP-AK-ORNL-001 Revisions 0 and 1. Scope of authorization is retrievably stored contact handled debris S5000 wastes. Any waste outside of this scope is considered a T1 change.
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)?	CCP-TP-005, Revision 18; CH-WAC Revision 3; P.L. 102-579	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	CCP-AK-ORNL-001 Revision. 0 and 1. Waste is retrievably stored and will undergo 100% RTR and NDA (all containers will be assayed) via the ORNL-CCP processes.

ATTACHMENT A.1: ACCEPTABLE KNOWLEDGE (AK) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

Inspection Date: November 13-15, 2007

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
[194.24(c)(2)-(5), 194.22(a)]			
<p>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 (100% sampling)?</p> <p>[194.24(c)(2)-(5)]</p>	CCP-TP-005, Revision 18; CH-WAC Revision 3; P.L. 102-579	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	CCP-AK-ORNL-001 Revisions 0 and 1. Newly generated waste was not in the scope of this inspection.
<p>AK-9: Procedures require staff to be qualified to assemble, compile, and confirm AK data, including, but not limited to:</p> <p>a. Identification of required reading list and successful completion of all required reading including, but not limited to:</p> <ul style="list-style-type: none"> • 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 <p>b. Successful completion of testing to demonstrate understanding of required reading list</p> <p>c. Completion of internal and/or external training programs pertinent to AK</p> <p>d. Participation in internal audits to assess AK program</p> <p>e. Other methodologies for demonstrating AK proficiency as developed on a site-specific basis</p> <p>(WAP B4, B4-3a)</p>	CCP-TP-005, Revision 18, Section 4.1.2; CCP-QP-002, Section 4.2	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	Training records for Jeff Harrison and Dave Atkins were reviewed. Data available indicate that both were trained in all areas, but there was no evidence of WIPP CCA training. EPA suggests that ORNL-CCP incorporate CCA/CRA training into its programs.
AK-10:	CCP-TP-005, Revision 18; CCP-TP-	Review of objective	Procedures examined include AK for

ATTACHMENT A.1: ACCEPTABLE KNOWLEDGE (AK) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

Inspection Date: November 13-15, 2007

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
<p>a. Are procedures adequate to encompass the spectrum of wastes for which authorization is sought?</p> <p>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?</p> <p>c. For newly generated waste, have adequate procedures been developed and implemented to characterize waste using acceptable knowledge prior to packaging?</p> <p>(WAP B4, B4-3b)</p>	066	evidence and interview of Jeff Harrison and Dave Atkins	retrievably stored debris waste; therefore the scope of the procedures examined compasses the desired authorization. The inspection did not include newly generated waste. Note that any substantive changes to CCP-TP-005 would be a T1 change.
ASSEMBLING AK INFORMATION AND COMPILING AK DOCUMENTATION INTO AN AUDITABLE RECORD			
<p>AK-11: What is the breakdown of the types and quantities of TRU waste generated/stored at the site?</p> <p>(WAP B4, B4-2a)</p>	CCP-TP-005, Revision 18, Section 4.4.8	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	TWBIR Reference 9, M012, U040 includes the most recent breakdown of wastes at the site. Note that CCP accepts wastes/streams identified by the site and indicated during interviews that personnel are not involved with full-site inventory analysis.
<p>AK-12: Do procedures call for AK information to be collected for:</p> <p>a. ²⁴¹Am, ²³⁸Pu, ²³⁹Pu, ²⁴⁰Pu, ²⁴²Pu, ²³³U, ²³⁴U, ²³⁸U, ⁹⁰Sr, ¹³⁷Cs + unexpected radionuclides</p> <p>b. Ferrous metals (in containers)</p> <p>c. Cellulosics, plastics, rubber</p> <p>d. Nonferrous metals (in containers)</p> <p>(CRA/CCA Ch 4 and Attachments/Appendices)</p>	CCP-TP-005, Revision 18, Sections 4.4.21, 4.4.22, 4.4.24	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	Attachment 6 of CCP-TP-005; Attachment 7 CCP-TO-005. Weight percent of WMPs and radiological characteristics are included in Attachments 6 and 7 as the AK-NDE and AK-NDA memoranda. Changes to the AK-NDA memorandum would be a T2 change, while revision to the AK-NDA memorandum specifically to address issues identified by EPA during the inspection is a T1 change.
<p>AK-13: Do procedures require documentation of radionuclide process origin?</p> <p>Are the facility and TRU waste management operations correlated to specific waste stream information?</p> <p>(Attachment B4; WAC Appendix A.2.2)</p>	CCP-TP-005, Revision 18, Section 4.4	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	CCP-AK-ORNL-001 Revisions 0 and 1, C122, P268, P272, P273, U016, U017, P284, I056, I058, I059, I061

ATTACHMENT A.1: ACCEPTABLE KNOWLEDGE (AK) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

Inspection Date: November 13-15, 2007

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
<p>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.</p> <p>(Attachment B4, B4-3c; WAC Appendix A, Section A.2)</p>	CCP-TP-005, Revision 18, Section 4.4	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	CCP-AK-ORNL-001 Revisions 0 and 1, U233, C100, C119, C121, C127, C130, I052, M007, M017-M019. CCP representatives indicated that new references (i.e., ²³³ U) would be added to the record (Attachment 4) to more thoroughly address the dates of D&D to ensure that record reflects waste stream generation.
<p>AK-15:</p> <p>a. Are waste streams appropriately identified and are wastes characterized on a waste stream basis?</p> <p>b. Are wastes grouped on a waste stream basis using Acceptable Knowledge?</p> <p>(Attachment B4, Section B-1a)</p>	CCP-TP-005, Revision 18, Section 4.4, 4.2.3	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	CCP-AK-ORNL-001 Revisions 0 and 1, U038. Describes the waste stream in detail for the post 2000 time period. Note that the machine compacted waste associated with the stream were not included in the stream as inspected.
<p>AK-16: Do procedures demonstrate a logical progression from general facility information to more detailed waste stream-specific information?</p>	CCP-TP-005, Revision 18, Section 4.4	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	CCP-AK-ORNL-001 Revisions 0 and 1, M001-M013, M016-M019, M021, P256, P272, P273. Can track waste through generation at building 234 to Energx/Foster Wheeler processes, to CCP management of containers.
<p>AK-17: Does the process include review of AK information to evaluate and document AK-AK information discrepancies?</p> <p>(WAC Section A.2.2.3, Attachment B4, Section B4-3)</p>	CCP-TP-005, Revision 18, Section 4.8	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	DR002 deals with radiological discrepancies. Note that this DR required revisions to more completely address how the issues were resolved (i.e., to state issue resolution). The revision of DR002 and any DRs are T2 changes.

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<p>AK-18: Do procedures require collection of information regarding how waste is tracked and managed at the generator site (including historical and current operations)?</p> <p>(WAC Section A.2; Attachment B4 Section B4-2a)</p>	CCP-TP-005, Revision 18, Section 4.4	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	PTS (and related CTS) printouts; AK Tracking Spreadsheet, M017, M018, M019. Site's EM-12 database tracks overall drums. The PTS's CTS module tracks NRCs internally. Historic tracking records included in M017-M019.
<p>AK-19: Is AK information compiled in an auditable record, including a road map for all applicable information?</p>	CCP-TP-005, Revision 18, Attachment 4	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	Attachments 1 and 4, of CCP-TP-005. Stream and general reference lists.
<p>AK-20: Has a reference list been provided that identifies documents, databases, Quality Assurance protocols, and other sources of information that support AK information?</p> <p>(Attachment B4, Section B4-3c)</p>	CCP-TP-005, Revision 18, Attachment 4	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	CCP-TP-005, Attachment 4. Note that CCP representatives indicated this list will be substantially revised to expand the stream in the near future; providing revisions to this checklist is a T2 change.
<p>AK-21: Have the following mandatory information requirements been identified?</p> <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> - Area(s) or building(s) from which the waste stream was or is generated - Estimated waste stream volume and time period of generation - Waste generating process description for each building or area - Process flow diagrams, if appropriate 	CCP-TP-005, Revision 18, Section 4.4	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	<p>CCP-AK-ORNL-001 Revisions 0 and 1; P273, CCP-TP-005, Attachment 8; C122, Attachment 7 AK-NDA Memorandum.</p> <p>The AK summary and associated references address mandatory information requirements noting that flow diagrams and other information may be in references, rather than the AK summary.</p> <p>AK-NDA memorandum includes information pertaining to scaling factors and general radiological characterization. Note that the CCP process calculated default isotopics based on MOX composition; several NDA analyses performed prior to CCP, but CCP does not believe that the measurements are valid. Specification for WIPP isotopes is provided in the AK-NDA memo. Revisions to this memorandum are required to explain ratio basis and other issues. Any</p>

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<ul style="list-style-type: none"> - 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 ²⁴¹Am) • 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 <p>(WAC Section A.2.2; Attachment B4, B4-2a, B4-2b)</p>			<p>changes to the AK-NDA memorandum to address EPA's concerns is a T1 change, while future changes to AK-NDA communications and memoranda are T2 changes.</p>
<p>AK-22: Does the site have procedures for the collection of supporting information? Examples of supplemental information, from WAC, include:</p> <ul style="list-style-type: none"> • Safeguards and security and other material control systems/programs • Reports of nuclear safety or criticality • Accidents involving SNM waste packaging and waste disposal • Building or nuclear material management area logs or inventory records • Site databases that provide SNM or nuclear material information test plans • Research project reports, or laboratory notebooks that describe the radionuclide content of materials used in 	<p>CCP-TP-005, Revision 18, Section 4.4</p>	<p>Review of objective evidence and interview of Jeff Harrison and Dave Atkins</p>	<p>CCP-TP-005, Attachment 4, C100, M012, M016, M017, M018, I056, M007, M011, P251, P256, P272, U016, U017, U040, P284. Adequate supporting information is present, noting that updates to Attachment 4 would be a T2 change.</p>

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<p>experiments</p> <ul style="list-style-type: none"> • Information from site personnel • Historical analytical data relevant to isotopic distribution in the waste stream <p>(WAC Section A.2.2.2; Attachment B4 Section B4-2c)</p>			
<p>AK-23: Is all necessary supporting information assembled and has it been appropriately used?</p> <p>(Section B4-2c)</p>	CCP-TP-005, Revision 18, Section 4.4	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	CCP-TO-005 Attachment 1. Cross references of data to requirements are presented, but site representatives indicated that additional information was being assembled to augment listing.
<p>AK-24:</p> <p>a. Are waste categorization schemes presented and are they appropriate?</p> <p>b. Are waste identification/categorization schemes relevant to the isotopic composition of waste?</p> <p>(Attachment B4 Section B1, WAC page ix, Appendix A.2)</p>	CCP-TP-005, Revision 18, Section 4.4	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	CCP-AK-ORNL-001 Revisions 0 and 1, Attachment 6. Note that waste categorization schemes are based on WMPs and do not include isotopic distribution, because it is not mandated by the CH definition of waste stream.
<p>AK-25: Have data uses and limitations been assembled and are they technically adequate?</p> <p>(CRA/CCA; WAC Appendix A, Section A.2.2.3)</p>	CCP-TP-005, Revision 18, Section 4.4	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	CCP-TP-005, Attachment 3 is included on each source document and sites data limitations. Example U044 should include a data limitation associated with the use of default isotopes, and future EPA inspections will include examination of this reference.
<p>AK-26: Site documents/procedures require the facility to 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?</p> <p>(WAC Appendix A Section A.2.2; Attachment B4 Section B4-2b, Attachment B Section B-3d (1), (2))</p>	CCP-TP-005, Revision 18, Section 4.4	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	CCP-AK-ORNL-001 Revisions 0 and 1. Revisions to the AK Summary to address EPA concerns and outstanding issues were considered a T1 change (note that Revision 1 was provided to EPA).

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<p>AK-27: Are conclusions and interpretations presented in the AK Summary technically sound and supported by referenced mandatory and supplemental information?</p>	CCP-TP-005, Revision 18	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	See AK-26. Note that CCP intends to update the AK Summary and provided Revision 1; additional revisions could occur in the future to expand the stream and would be considered a T2 change. Also note that updated Attachments 4 and 6 are considered T2 changes, both of which will document future expansions of the stream.
<p>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.</p> <p>(WAC Appendix A.2, Section A.2.2.3)</p>	CCP-TP-005, Revision 18, section 4.4	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	DR002; note that changes to this DR were required to address EPA issues identified during the inspection.
<p>AK-29: Has the use of load management been proposed? Does the AK Summary include the following from the WAC, Revision 3, Appendix E?</p> <ul style="list-style-type: none"> • 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) <p>(WAC, Appendix E)</p>	CCP-TP-005, Revision 18, Section 4.4	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	Load management is not proposed. Implementation of load management would be a T1 change.
<p>AK-30: Are nonconforming wastes segregated? Are NCRs dispositioned in an appropriate and technically</p>	CCP-TP-005, Revision 18	Review of objective evidence and interview of	NCR examples were provided from CTS. Note that EPA assessed container tracking

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defensible manner? (Attachment B4, Section B4-3b, Attachment B3, Section B3-13)		Jeff Harrison and Dave Atkins	separately from the evaluation of AK.
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)	CCP-TP-005, Revision 18, Section 4.4	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	Not Applicable. Necessary information was available for the stream OR-NFS-CH-HET, as examined during the inspection.
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 for the proposed scope? (Attachment B4, Section B4-2)	CCP-TP-005, Revision 18, Section 4.4	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	Batch Data Reports OR-RTR-002, 006 and 007; OR-DWAS-001, 002; M016, M017, M018, Attachment 8 of CCP-TP-005; Draft WSPF and CCR. Traceability can be performed from original NFS-shipped containers through Energyx/Foster wheeler processes/repackaging, to CCP.
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 WAC)?* <ul style="list-style-type: none"> • 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. <u>For ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Pu, ^{242}Pu and ^{241}Am:</u> <ul style="list-style-type: none"> • Confirmation can be accomplished via comparison of measured and AK values for $^{239}\text{Pu}/^{240}\text{Pu}$ for weapons grade plutonium; $^{238}\text{Pu}/^{239}\text{Pu}$ 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) 	CCP-TP-005, Revision 18	Review of objective evidence and interview of Jeff Harrison and Dave Atkins; NDA personnel also involved with discussions: Norman Frank, John West, Joe Wachter, Sean Stanfield, Barry Smith, George Westik, Christa Chavez, and Joseph Harvill	AK-NDA memo default isotopics; note that default isotopics are used for all plutonium isotopes except for ^{241}Am . Default isotopics were calculated assuming the radionuclide distributions for each fuel material type were distributed equivalently throughout the D&D waste. Quantities of Pu for each material type were scaled based on the amount of that material managed in Building 234, with SEFOR providing the greatest contribution. Plutonium isotopics were calculated based on the actual contract composition of the fuel. Uranium content was scaled based upon percentage uranium in the various MOX fuels and calculated in accordance with procedure LA-UR-00-2584. Note that a reference should be added to the record supporting

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<ul style="list-style-type: none"> • ^{241}Pu can be compared (by ratio) to confirm AK of any Pu isotope associated with WG/RG (i.e., ^{239}Pu or ^{240}Pu) • ^{238}Pu from AK for WG/RG Pu is assumed to be valid if the AK values of ^{239}Pu and ^{240}Pu have been confirmed by measurement • ^{242}Pu calculated by correlation techniques, since it can't be measured <p>b. <u>For ^{235}U, ^{233}U, ^{238}U, ^{234}U:</u></p> <ul style="list-style-type: none"> • 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 <p>c. <u>For ^{137}Cs and ^{90}Sr:</u></p> <ul style="list-style-type: none"> • Confirmed by WIPP-certified system (direct measurement or comparison of ^{241}Am peak at 662 keV to other ^{241}Am peaks (disproportionate ^{241}Am peak at 662 keV could mean presence of ^{137}Cs) • ^{90}Sr calculated from ^{137}Cs using scaling factors <p>Other radionuclides – must identify via NDA and should identify via AK</p> <p>*If the WAC requirements are not followed, identify how the specific radionuclides are characterized via AK, and how these data are used by NDA.</p> <p>(40 CFR 149.22(b), WAC, Appendix A, Section A.2.1)</p>			<p>the 1:1 ratio used for ^{137}Cs and ^{90}Sr.</p>

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<p>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?</p> <p>(194.24 (c)(3); 194.22(b))</p>	CCP-TP-005, Revision 18	Not Applicable	Not applicable; newly generated waste was not included in the scope of EPA's inspection.
<p>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.</p> <p>(Attachment B4, Section B4-3d)</p>	CCP-TP-005, Revision 18, Section 4.9		CCP-TP-005, Attachment 10 (example only); NDE has not to date misidentified wastes by waste matrix code such that waste reassignment was required.
<p>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 B4-3e?</p> <p>(Attachment B4, Section B4-3e)</p>	CCP-TP-005, Revision 18	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	Not applicable; newly generated waste was not included in the scope of EPA's inspection.
<p>AK-37: Procedures require the following steps to be followed if wastes are reassigned to a different waste matrix code based on NDE:</p> <ul style="list-style-type: none"> • 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 	CCP-TP-005, Revision 18, Attachment 10	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	CCP-TP-005, Attachment 10; example provided from alternative site; no example available yet for ORNL-CCP

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<p>the process material inputs are consistent with the waste material parameters identified during radiography or visual examination</p> <ul style="list-style-type: none"> • 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 <p>(Attachment B4, Section B4-3e)</p>			
<p>AK-38: Has the acceptable knowledge expert calculated the percent changes in waste matrix code based on AK and NDE/VE? Were accuracy evaluations assigned? Are these acceptable?</p> <p>(Attachment B3, Section B3-9; WAC Appendix A, Section A.6.5)</p>			<p>An AK accuracy report has not yet been prepared for ORNL-CCP. However, EPA has evaluated the AK accuracy preparation process at other sites.</p>
<p>AK-39: Are the following items addressed with respect to AK-NDA communication and the use of AK data by NDA personnel?</p> <ul style="list-style-type: none"> • Do procedures require the identification of AK data limitations? • Are AK data and associated limitations communicated to NDA personnel and is this required by procedure? • How is AK used by NDA personnel? • Do AK and NDA personnel communicate and agree about the use of AK? • Is this agreement proceduralized? <p>(WAC, Appendix A)</p>	<p>CCP-TP-005, Revision 18, Attachment 6 and Section 4.4.22</p>		<p>CCP-TP-005 Attachment 6 includes the AK-NDA memorandum. This memorandum required revision to address EPA concerns regarding continuity of the Memo, AK Summary, and DR002. The memorandum does not address specifically how NDA personnel use default isotopics, even though AK and NDA personnel indicated that default isotopics were used for most of the drums from this CH waste stream. EPA requires that while CCP did not revise the AK-NDA memorandum to be more specific in this regard, CCP shall document and justify the use of default isotopics when used, and all forthcoming AK-NDA memoranda must specify how NDA personnel use AK data.</p>

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<p>AK-40: Have internal AK audits been performed? (Attachment B4, Section B4-3d, g)</p>	CCP-TP-005, Revision 18 CCP-TP-005, Revision 18	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	CCP Internal Surveillance Dated November 14, 2007
<p>AK-41: 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. (WAC Section A.2.2.3; Attachment B4, Sections B4-3b, B4-33, Attachment B3)</p>	CCP-TP-005, Revision 18	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	Not Applicable to this site; baseline inspection, so not enough information collected to require this reassessment.
<p>AK-42: 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:</p> <p>a. Precision - Precision is not applicable to AK (see Attachment B4)</p> <p>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 is 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.</p> <p>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</p>	CCP-TP-005, Revision 18	Review of objective evidence and interview of Jeff Harrison and Dave Atkins	<p>No AK Accuracy report was prepared (see AK-38). Note that the AKE indicated that the AK Summary would be updated immediately post-inspection to include additional references and to update the AK Record (e.g., reference C233).</p> <p>Section A.6.5 of the WAC has not been addressed or completed, as no comparisons were completed at the time of the inspection.</p> <p>Minimum standards were established.</p>

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<p>be assessed for completeness during audits.</p> <p>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. WAC Section A.6.5: Additionally, comparison of measured data with AK-derived or -based values, as applicable, provides a means to assess comparability on a waste stream basis.</p> <p>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.</p> <p>(Attachment B3, Section B3-9)</p>			
<p>AK-43: 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).</p> <p>(Attachment B3, Section B3-9)</p>	<p>CCP-TP-005, Revision 18</p>	<p>Review of objective evidence and interview of Jeff Harrison and Dave Atkins</p>	<p>CCP tracks via “L” trend code analysis. CCP AK representatives indicated that this was outside of the AK scope. CCP representatives also indicated that annual internal surveillances are performed to assess AK performance. EPA will assess L trend code performance for Oak Ridge in the future, once characterization has been ongoing for a period of time.</p>

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Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Examples of Objective Evidence
<p>AK-44: 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? What process controls are in place to assess prohibited items and other waste characteristics (i.e. is fast scan used, and, if so, by whom)?</p> <p>(Attachment B4, Section B4-3b)</p>	<p>CCP-TP-005, Revision 18</p>	<p>Review of objective evidence and interview of Jeff Harrison and Dave Atkins</p>	<p>P254. CCP representatives indicated that historic AK VE/RTR data are used to assess the presence of prohibited items, and that Foster Wheeler may (then) process or repackage waste to address issues using non-WIPP methods. CCP would then perform VE on these processed containers in accordance with CCP/WIPP procedures. If a prohibited item is found, it will be addressed via NCR and sent back to Foster Wheeler/Energx. CCP does not perform fast scan on the containers.</p>
<p>AK-45: 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?</p> <p>(Section B4-3e)</p>	<p>CCP-TP-005, Revision 18</p>	<p>Review of objective evidence and interview of Jeff Harrison and Dave Atkins</p>	<p>CCP representatives indicated that OR's CH program deadlines have apparently been affected or otherwise impacted by state agreements to establish a CH characterization program by a certain date (Jan, 2008). A similar requirement is in place for RH waste (Jan, 2009). Therefore, state agreements have impacted the schedule associated with CH and forthcoming RH waste characterization.</p>

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

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Inspection Date: November 13 – 15, 2007

NDA System: Drum Waste Assay System – Imaging Passive-Active Neutron/Mobile Segmented Gamma Assay System (DWAS-IPAN/SGS)

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	Not Applicable	The NDA system is the Drum waste Assay System (DWAS) consisting of an Imaging Passive/Active Neutron and segmented Gamma Scanner (IPAN SGS). It is located in Building 7880-I of the TRU Waste Processing Center (TWPC).	NA	Not Applicable
Describe the system's operational history including deployment at other DOE sites.	NA	Not Applicable	This is the first time this system has been evaluated by EPA for conducting WIPP assays	NA	Not Applicable
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	Not Applicable	This system was operational prior to this inspection but not for WIPP-bound TRU wastes.	NA	Not Applicable
System Performance					
Identify the period of performance relevant to this inspection and if this NDA system has prior EPA approval(s).	NA	Not Applicable	Operation of the DWAS IPAN/SGS began on 10-07-07.	NA	Interviews with ORNL-CCP NDA personnel. J. Wachter, S. Stanfield, G. Westsik
Identify the type (55-gallon drums, or SWBs) and 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. If multiple waste containers have been assayed assign a total to each container type.		CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	As of 11-13-07 a total of 20 55-gallon (208 liter) drums have been assayed, and these have been compiled in 3 Batch Data Reports (BDRs) all of which have been promoted through Project Level Review.		Interviews with ORNL-CCP NDA personnel. J. Wachter, S. Stanfield, G. Westsik

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

Inspection Date: November 13 – 15, 2007

NDA System: Drum Waste Assay System – Imaging Passive-Active Neutron/Mobile Segmented Gamma Assay System (DWAS-IPAN/SGS)

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-002, CCP Transuranic Waste Certification Plan, Revision 19	The DWAS reports 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	DWAS BDRs OR-DWAS-0001, OR-DWAS-0002 and OR-DWAS-0003
Each container characterized and intended for disposal at WIPP must contain TRU waste.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	Only wastes containing greater than TRU radionuclides at concentrations greater than 100 nCi/g are promoted as WIPP eligible by ORNL-CCP.	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1; DWAS BDRs OR-DWAS-0001, OR-DWAS-0002 and OR-DWAS-0003
NDA instruments and procedures are appropriate for the waste streams being assayed.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	The DWAS system and supporting procedures are appropriate for the waste stream within the scope of this inspection.	Y	DWAS BDRs OR-DWAS-0001, OR-DWAS-0002 and OR-DWAS-0003
NDA instruments and procedures result in unbiased values for the cumulative activity of the WIPP radionuclide inventory.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	The DWAS and supporting procedures produce values that are appropriate for calculation of the WIPP-tracked radionuclides	Y	DWAS BDRs OR-DWAS-0001, OR-DWAS-0002 and OR-DWAS-0003
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-002, CCP Transuranic Waste Certification Plan, Revision 19	^{90}Sr , ^{234}U and ^{242}Pu are determined by the application of scaling factors for gamma determinations. For active and passive neutron determinations, radionuclide-specific values are derived based on the measured $^{239}\text{Pu}_{\text{EFF}}$ and $^{240}\text{Pu}_{\text{EFF}}$, respectively.	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

Inspection Date: November 13 – 15, 2007

NDA System: Drum Waste Assay System – Imaging Passive-Active Neutron/Mobile Segmented Gamma Assay System (DWAS-IPAN/SGS)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
					and Verification Report, Revisions 0 & 1
Assess the technical adequacy of the calculations involving the application of scaling factors and/or correlation techniques.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	^{90}Sr , ^{234}U and ^{242}Pu are determined by the application of scaling factors whose technical bases and derivation are documented in the gamma calibration report. Active and Passive Mode neutron assays rely on the measurement of $^{239}\text{Pu}_{\text{EFF}}$ and $^{240}\text{Pu}_{\text{EFF}}$, respectively, and the application of isotopic distributions to obtain radionuclide-specific values as documented in the neutron calibration report.	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1; CCP-TP-168, CCP DWAS IPAN/SGS Data Generation Level Validation, Revision 0
Identify the procedures that govern this function and where the results of these calculations are documented.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	The procedures that govern this function are provided to the right. The results of the calculations are documented in the DWAS BDRs.	Y	CCP-TP-169, Operating the Mobile Segmented Gamma Scanner, Revision 0; CCP-TP-166, Drum Waste Assay System Imaging Passive/Active Neutron Operations, Revision 0; CCP-TP-168, CCP DWAS IPAN/SGS Data Generation Level Validation, Revision 0
Acceptable Knowledge (AK)					
If isotopic ratios based on AK are used the values are qualified by confirmatory testing.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	AK-based isotopics are used when such values can be supported by the AK documentation process.. All containers (one hundred percent) are subjected to radioassay using the DWAS.	Y	CCP-AK-ORNL-001, Revision 0; CCP-AK-ORNL-001, NDA Memo, October 17, 2007; supporting AK documents; CCP-TP-168, Revision 0

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

Inspection Date: November 13 – 15, 2007

NDA System: Drum Waste Assay System – Imaging Passive-Active Neutron/Mobile Segmented Gamma Assay System (DWAS-IPAN/SGS)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
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-002, CCP Transuranic Waste Certification Plan, Revision 19	The NDA Expert Analyst (EA) used AK-derived isotopic values to calculate radionuclide values in conjunction with approved AK values as documented in the references listed in the right column of this row.	Y	CCP-AK-ORNL-001, Revision 0; CCP-AK-ORNL-001, NDA Memo, October 17, 2007; supporting AK documents; CCP-TP-168, Revision 0
Identify the procedure and where the results of these calculations are documented.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	The application of AK-based isotopics is addressed in the data generation level validation procedure and the results of the calculation are in the DWAS BDRs.	Y	CCP-TP-168, Revision 0, Section 4.1
Isotopic Determination					
Identify the radionuclides that are measured directly and the specific radiation type (γ , AN or PN) that is measured.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	Gamma: Directly measured radionuclides include: ^{238}Pu , ^{239}Pu , ^{240}Pu , ^{241}Am , ^{233}U , ^{238}U and ^{137}Cs . Active and passive neutron: Radionuclide-specific values are derived based on the measured $^{239}\text{Pu}_{\text{EFF}}$ and $^{240}\text{Pu}_{\text{EFF}}$, respectively.	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1
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-002, CCP Transuranic Waste Certification Plan, Revision 19	The DWAS uses Multi Group Analysis (MGA), PC FRAM and the application of AK-based isotopics. The use of these techniques is subject to expert decision.	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

Inspection Date: November 13 – 15, 2007

NDA System: Drum Waste Assay System – Imaging Passive-Active Neutron/Mobile Segmented Gamma Assay System (DWAS-IPAN/SGS)

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-002, CCP Transuranic Waste Certification Plan, Revision 19	An LLD has been determined for all operational modes: active mode neutron assays, passive mode assays and gamma assays. The LLD determination for the active and passive modes was not adequately addressed for ⁹⁰ Sr and ²³⁴ U. These are required according to CCP-TP-167, Section 4.6.1, but Revision 2 of BII-5183-CVR-001 did not contain information regarding them. BII-5183-CVR-001 was revised and Revision 3 included the required information for ⁹⁰ Sr and ²³⁴ U.	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1
Site-specific environmental backgrounds and container-specific interferences must be accounted for in LLD determinations.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	Site-specific environmental backgrounds and container-specific interferences are addressed in the DWAS LLD determinations.	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1
NDA instruments performing TRU/Non-TRU waste discrimination measurements are required to have a LLD no greater than 100 nCi/g.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	The DWAS IPAN/SGS will not be used to discriminate TRU & Non-TRU wastes at the 100 nCi/g criterion.	NA	Not Applicable
The technical basis and derivation for LLDs must be adequate and appropriately documented.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	The technical basis and derivation for the LLDs for all three operational modes are technically adequate and appropriately documented.	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

Inspection Date: November 13 – 15, 2007

NDA System: Drum Waste Assay System – Imaging Passive-Active Neutron/Mobile Segmented Gamma Assay System (DWAS-IPAN/SGS)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
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-002, CCP Transuranic Waste Certification Plan, Revision 19	Gamma: LLDs for ^{238}Pu , ^{240}Pu and ^{242}Pu are derived from the measured ^{239}Pu value; the LLD for ^{90}Sr is based on the measured ^{137}Cs value. Neutron: The Active and Passive Mode LLDs are derived by application of isotopic ratios to the measured $^{239}\text{Pu}_{\text{EFF}}$ and $^{240}\text{Pu}_{\text{EFF}}$, respectively. Sample values based on a $^{239}\text{Pu}_{\text{EFF}}$ value of 10 mg are shown in BII-5183-CVR-001, Table 12.	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1
Identify any/all instances where an LLD value for a <i>non-measured</i> radionuclide is not provided basis on a lack of technical feasibility.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	For gamma assays ORNL-CCP personnel stated that the determination of a unique reporting threshold for ^{234}U is not technically feasible. There are no instances where a unique reporting threshold in not provided on the basis of a lack of technical feasibility for neutron-based assays.	Y	MV-SGS-0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1
Are LLD values container/assay event specific or are typical LLD values applied to a class or type of wastes, i.e., those with similar attributes? If LLD values are not container/assay event specific identify the attributes or characteristics whereby waste containers are grouped.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	Gamma: LLD values are assay-event specific Neutron: Active and Passive Mode LLD values are assay-event specific and are provided as a function of the ABSMOD and MOD indices, respectively.	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1
Total Measurement Uncertainty (TMU)					
The method used to calculate the TMU for all required quantities must be documented and technically justified.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	The method used to calculate the TMU for all three operational modes of the DWAS are technically adequate and appropriately documented.	Y	BII-TMU-5183-001, DWAS IPAN Total Measurement Uncertainty Report; CI-SGS01-TMU, Total Measurement Uncertainty for the MCS Melton Valley SGS, Revision 1

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

Inspection Date: November 13 – 15, 2007

NDA System: Drum Waste Assay System – Imaging Passive-Active Neutron/Mobile Segmented Gamma Assay System (DWAS-IPAN/SGS)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
TMU determination accounts for all sources of uncertainty, specifically <ul style="list-style-type: none"> • 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-002, CCP Transuranic Waste Certification Plan, Revision 19	The TMU determination accounts for all sources of uncertainty for the three operational modes of the DWAS.	Y	BII-TMU-5183-001, DWAS IPAN Total Measurement Uncertainty Report; CI-SGS01-TMU, Total Measurement Uncertainty for the MCS Melton Valley SGS, Revision 1
Methods to determine TMU must be documented, reviewed and approved by CBFO for each NDA instrument.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	Approval of TMU for the DWAS was performed as part of the CBFO audit that occurred concurrently with this EPA inspection.	NA	Not Applicable

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

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NDA System: Drum Waste Assay System – Imaging Passive-Active Neutron/Mobile Segmented Gamma Assay System (DWAS-IPAN/SGS)

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-002, CCP Transuranic Waste Certification Plan, Revision 19	The DWAS was calibrated prior to use for WIPP assays at ORNL-CCP. The calibration reports listed provide all necessary information regarding the system's calibration. Calibration reports for the gamma and neutron operational modes had minor problems, as indicted in several places in this checklist, all of which were fixed in the revised documents that ORNL-CCP submitted following the inspection. This checklist shows both revisions for the gamma and neutron calibration reports.	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1
The range of applicability of the system 's calibration(s) must be specified in site procedures or other formal documentation. Identify the manner in which the range is expressed, i.e., curies (or mass) of Pu/SNM for activity and salient physical characteristics for matrix.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	Gamma: Calibrated range is LLD to 45 g Total Pu (administrative limit), limited by system performance; efficiency range is 59 to 1332 keV; matrix is generally Z<15, density from 0 to 0.72 g/cm ³ (Summed Spectrum Mode) Neutron: Active Mode range is LLD to 14.710 g ²³⁹ Pu _{EFF} , ABSMOD range 22.251 to 276.800; Passive Mode range is LLD to 2.050 g ²⁴⁰ Pu _{EFF} , MOD range from 1.045 to 17.572	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1
Any matrix/source surrogate waste combinations must be representative of the activity ranges and relevant waste matrix characteristics currently in use or planned for use by the system. The system must be calibrated to 100% recovery.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	The matrix/source surrogate waste combinations used for calibration are representative of the activity ranges and relevant waste matrix characteristics of the wastes within the scope of this inspection. The DWAS is calibrated to 100% recovery for all three operational modes.	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

Inspection Date: November 13 – 15, 2007

NDA System: Drum Waste Assay System – Imaging Passive-Active Neutron/Mobile Segmented Gamma Assay System (DWAS-IPAN/SGS)

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-002, CCP Transuranic Waste Certification Plan, Revision 19	Consensus standards were used to calibrate the DWAS; ASTM-C-1030, C-1133, C-1215 and E-181 for gamma; NUREG/CR-5550 (LA-UR-90-732) for neutrons	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1
Identify the specific consensus standards that were used for the system calibration or, in their absence, the alternate calibration technique. Evaluate the CBFO approval of the alternate technique.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	See response to previous checklist entry.	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1
Primary standards must be obtained from suppliers maintaining a nationally accredited measurement program. Identify the nationally accredited measurement program.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	All primary standards were obtained from suppliers that maintain a nationally accredited measurement program; Isotope Products Laboratory and LANL	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

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Inspection Date: November 13 – 15, 2007

NDA System: Drum Waste Assay System – Imaging Passive-Active Neutron/Mobile Segmented Gamma Assay System (DWAS-IPAN/SGS)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
List the standards used for calibration and verify the pedigree of each standard.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	The gamma and neutron standards used for calibration are listed in the calibration reports and their pedigrees have been verified.	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1
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-002, CCP Transuranic Waste Certification Plan, Revision 19	The gamma, active and passive neutron calibrations have been verified as required.	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1
Recalibration of the system must occur if the calibration verification demonstrates that the system's response has significantly changed.	NA	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	A system recalibration has not occurred.	NA	Not Applicable

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NDA System: Drum Waste Assay System – Imaging Passive-Active Neutron/Mobile Segmented Gamma Assay System (DWAS-IPAN/SGS)

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-002, CCP Transuranic Waste Certification Plan, Revision 19	The calibration confirmations for gamma, active neutron and passive neutron have been performed.	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1
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-002, CCP Transuranic Waste Certification Plan, Revision 19	Replicate measurements were performed with containers of the same size and with the same procedures used for routine waste assays for all three operational modes	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1
Replicate measurements must be performed using nationally recognized standards or standards derived from nationally recognized standards that span the range of use of the instrument with respect to disintegration rate and/or matrix effects. Identify all standards that were used and indicate their application (verification or confirmation).	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	Replicate measurements were performed using 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 and their applications are documented. The instrument calibration reports cited provide all required information relative to the DWAS calibration..	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1
Identify the nationally accredited measurement program. List the standards used for verification/confirmation and verify the pedigree of each standard.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	See previous checklist entry.	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma

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NDA System: Drum Waste Assay System – Imaging Passive-Active Neutron/Mobile Segmented Gamma Assay System (DWAS-IPAN/SGS)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
					Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1
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-002, CCP Transuranic Waste Certification Plan, Revision 19	The standards used for calibration confirmation were distinct from those that were used for the calibration of all three operational modes.	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1
Requirements for accuracy, expressed as %R, and precision, expressed as %RSD, must be met as specified in DOE/WIPP-02-3122, Appendix A, Table A-3.2 for precision as a function of the number of replicates that were measured and $\sqrt{30\%}$ for accuracy.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	Requirements for accuracy and precision that are specified in DOE/WIPP-02-3122, Appendix A, Table A-3.2 were met for all three operational modes except for the 32 g Pu (nominal) standard that failed due to low bias. This failure was attributed to self-absorption of the encapsulated source for which a correction factor can be applied.	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1

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NDA System: Drum Waste Assay System – Imaging Passive-Active Neutron/Mobile Segmented Gamma Assay System (DWAS-IPAN/SGS)

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-002, CCP Transuranic Waste Certification Plan, Revision 19	Personnel performing radioassay and data validation are appropriately trained and qualified.	Y	ORNL-CCP Program List of Qualified Individuals, 10-18-2007, 1:56PM provided prior to the inspection; CCP-TP-168, CCP DWAS IPAN/SGS Data Generation Level Validation, Revision 0
Identify the name, title and function of all personnel performing NDA data validation.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	Expert Analysts (EAs) are Bob Ceo, Alan Simpson, John West and George Westsik. Independent Technical Reviewers (ITRs) are Barry Smith, Ron Whitson and Debbie Satterfield	Y	ORNL-CCP Program List of Qualified Individuals, 10-18-2007, 1:56PM provided prior to the 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-002, CCP Transuranic Waste Certification Plan, Revision 19	Training for all DWAS Operators, EAs and ITRs were current.	Y	ORNL-CCP Program List of Qualified Individuals, 10-18-2007, 1:56PM provided prior to the inspection.
The site must participate in relevant measurement comparison programs sponsored or approved by CBFO, including the NDA PDP.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	The DWAS had participated in NDA PDP Cycle 13A prior to its use by ORNL-CCP for WIPP assays. The DWAS is registered to participate in future PDP cycles	Y	Performance Demonstration Program for NDA of Drums, System Registration Form, signed by Christa Chavez October 10, 2007
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-002, CCP Transuranic Waste Certification Plan, Revision 19	The DWAS BDRs reviewed provide evidence of appropriate background measurements.	Y	DWAS BDRs OR-DWAS-0001, OR-DWAS-0002 and OR-DWAS-0003

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

Inspection Date: November 13 – 15, 2007

NDA System: Drum Waste Assay System – Imaging Passive-Active Neutron/Mobile Segmented Gamma Assay System (DWAS-IPAN/SGS)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
Assess how often background radiation was problematic to the extent that measurement personnel had to make adjustments.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	No instances of this were observed in the BDRs evaluated during this inspection.	NA	Not Applicable
Identify the criteria used to evaluate instrument backgrounds and assess the technical adequacy of this criterion, i.e., statistical or administrative.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	The criteria for gamma and neutron assays are provided in the operating procedures and calibration reports for the SGS and IPAN operational modes.	Y	Revision 0 of CCP-TP-166, CCP-TP-172, CCP-TP-167, CCP-TP-169 and CCP-TP-168; BII-5183-CVR-001; MV-SGS-0101-CAL-001
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-002, CCP Transuranic Waste Certification Plan, Revision 19	The initial gamma control limits that are statistical in nature were derived using 5 points		
System performance checks must be performed at least once per operational day.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	The DWAS BDRs evaluated for this inspection document performance checks at the required intervals.	Y	DWAS BDRs OR-DWAS-0001, OR-DWAS-0002 and OR-DWAS-0003; CCP-TP-168, Revision 0; CCP-TP-166, Revision 0, Attachments 2 & 3
System performance checks must include, as applicable, efficiency, matrix correction checks, and systems peak position and resolution for spectrometric systems.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	Gamma checks include 344.3 keV centroid and Full-Width-at-Half-Maximum (FWHM), background, transmission and calibration checks and Weighted Mean Activity. Neutron checks include Raw Coincidence Count rate, $^{239}\text{Pu}_{\text{EFF}}$ Mass and $^{240}\text{Pu}_{\text{EFF}}$ Mass	Y	DWAS BDRs OR-DWAS-0001, OR-DWAS-0002 and OR-DWAS-0003; CCP-TP-168, Revision 0
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-002, CCP Transuranic Waste Certification Plan, Revision 19	The DWAS BDRs evaluated for this inspection document interfering matrix checks at the required intervals.	Y	DWAS BDRs OR-DWAS-0001, OR-DWAS-0002 and OR-DWAS-0003; CCP-TP-168, Revision 0; CCP-TP-169, Revision 0
Interfering surrogate waste matrices must be constructed in a way that the salient matrix characteristics do not change over time.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan,	Surrogate matrices are constructed appropriately.	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

Inspection Date: November 13 – 15, 2007

NDA System: Drum Waste Assay System – Imaging Passive-Active Neutron/Mobile Segmented Gamma Assay System (DWAS-IPAN/SGS)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
		Revision 19			Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1
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-002, CCP Transuranic Waste Certification Plan, Revision 19	The radionuclide sources used for performance checks are technically appropriate.	Y	BII-5183-CVR-001, DWAS IPAN Calibration and Validation Report, Revisions 2 & 3; MV-SGS-0101-CAL-001, Segmented Gamma Scanner-01 (SGS-01-01) Calibration, Confirmation and Verification Report, Revisions 0 & 1
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-002, CCP Transuranic Waste Certification Plan, Revision 19	Decay corrections for the ^{252}Cf ($^{240}\text{Pu}_{\text{EFF}}$ Mass) are performed as required	Y	CCP-TP-166, Revision 0, Section 4.2.4; CCP-TP-168, Revision 0; DWAS BDRs OR-DWAS-0001, OR-DWAS-0002 and OR-DWAS-0003
Performance checks must be quantitative and based on 2 and 3 sigma limits.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	Gamma control limits are non-statistical (background, transmission source peak centroid, FWHM and count rate)	Y	CCP-TP169, Revision 0, Sections 4.3 & 4.4

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

Inspection Date: November 13 – 15, 2007

NDA System: Drum Waste Assay System – Imaging Passive-Active Neutron/Mobile Segmented Gamma Assay System (DWAS-IPAN/SGS)

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-002, CCP Transuranic Waste Certification Plan, Revision 19	All radioassay data examined during this inspection contained evidence of review and approval by qualified personnel, i.e., ITRs and EAs, as appropriate.	Y	DWAS BDRs OR-DWAS-0001, OR-DWAS-0002 and OR-DWAS-0003; CCP-TP-168, Revision 0
Identify the name, title and function of the individual(s) performing technical review and approval of NDA BRDs.	Y	CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 19	EAs are Bob Ceo, Alan Simpson, John West, George Westsik. ITRs are Barry Smith, Ron Whitson and Debbie Satterfield	Y	ORNL-CCP Program List of Qualified Individuals, 10-18-2007, 1:56PM provided prior to the inspection.
Radioassay BDRs must consist of the following elements: <ul style="list-style-type: none"> • 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-002, CCP Transuranic Waste Certification Plan, Revision 19	The DWAS BDRs that were reviewed during this inspection contained all required elements.	Y	DWAS BDRs OR-DWAS-0001, OR-DWAS-0002 and OR-DWAS-0003

ATTACHMENT A.2: NONDESTRUCTIVE ASSAY (NDA) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

Inspection Date: November 13 – 15, 2007

NDA System: Drum Waste Assay System – Imaging Passive-Active Neutron/Mobile Segmented Gamma Assay System (DWAS-IPAN/SGS)

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
Radioassay data sheets must include: <ul style="list-style-type: none"> • 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-002, CCP Transuranic Waste Certification Plan, Revision 19	The radioassay data sheets from the DWAS BDRs that were reviewed contained all required elements.	Y	OR-DWAS-0001: X10C0501223, X10C0501359 OR-DWAS-0002: X10C0501369, X10C0501407 OR-DWAS-0003: X10C0501146, X10C0501111
The following nonpermanent records must be maintained at the radioassay-testing facility or forwarded to the site project office: <ul style="list-style-type: none"> • Testing batch reports • All raw data, including instrument readouts, calculation records, and radioassay QC results • All applicable instrument calibration reports 	NA	Not Applicable	Not assessed during this inspection	NA	Not Applicable

ATTACHMENT A.3: REAL-TIME RADIOGRAPHY (RTR) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

Inspection Date: November 13-15, 2007

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comments
<p>RTR-1: Site procedures identify required training and qualifications for RTR personnel.</p>	<p>CCP-TP-028, Revision 3 CCP-QP-002, Revision 25</p>	<ul style="list-style-type: none"> • Operator training was consistent with applicable procedures. • Operator certification is current. • OJT was documented for each operator. • Operators are re-qualified every two years. • RTR operators passed a training drum test that includes items common to the waste streams examined at the site (biannually.) • RTR operators receive training on the waste matrix parameters and typical packaging configurations expected in each waste stream. 	<p style="text-align: center;">Y</p>	<p>There are four qualified RTR operators/ITRs at the site, all of whom were qualified in September or October 2007. At least two of the operators were transferred to ORNL from Savannah River Site and have considerable experience in the execution of RTR examinations.</p> <p>During the inspection, EPA reviewed the records of the capability demonstration for selected radiography personnel. The audio/visual recordings for the latest capability demonstration container for the drum RTR operator/ITRs were viewed during the inspection. The operators performing the on-site demonstration had a hard copy of the AK Summary Report, CCP-AK-ORNL-001, available to verify the WMC and physical form of the waste examined. Training records reviewed indicated that only trained personnel were operating the RTR equipment.</p> <p>The operator/ITRs successfully identified all of the prohibited items contained in the training drum. However, the operators/ITRs consistently demonstrated that they were unable to identify all of the unknown items in the drum, including cardboard and a plastic measuring cylinder. EPA generated concern ORNL-CCP-CH-RTR-004CR to address this issue.</p> <p><u>ORNL-CCP-CH-RTR-004CR:</u></p> <p>In the capability demonstration training containers, the EPA inspector noted that while all the required prohibited items were identified correctly by all RTR operators, some additional items (cellulosics and plastics) were not identified. All cellulosics and plastics in the training drum need to be identified and their</p>

ATTACHMENT A.3: REAL-TIME RADIOGRAPHY (RTR) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

Inspection Date: November 13-15, 2007

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comments
				<p>identification documented. To complete the training process, it is critical that the operator receives feedback regarding missed items. More detailed documentation of the feedback given is needed when the results of the training drum are reviewed.</p> <p><u>Objective evidence:</u></p> <ol style="list-style-type: none"> 1. Radiography Data Sheet for capability demonstration for the four (4) qualified RTR operators/ITRs, dated 9/26/07 or 10/1/07 2. Audio/visual recording of drum RTR capability demonstration for the four (4) operators/ITRs, dated 9/26/07 or 10/1/07 3. Inventory for training drums, ORNL-NDE-TEST-001 and ORNL-NDE-TEST-002
<p>RTR-2: Site procedure(s) provide complete instructions for operators to perform the RTR examination and completion of the associated documentation.</p>	<p>CCP-TP-053, Revision 5</p>	<ul style="list-style-type: none"> • 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). 	<p>Y</p>	<p>EPA observed the RTR examination of drum X10C0501308, Batch OR-RTR6-0013. One operator performed the examination and called out the items identified. The operators were able to explain and demonstrate how RTR data are entered into the electronic data sheet (Attachment 2) and how WMP weights are estimated. The procedure used contains complete instructions for performing RTR examinations and recording data. The procedure was implemented as written.</p> <p>When opened, the templates for Attachments 1 and 2 of procedure CCP-TP-053 already contained some RTR data. This could have led to incorrect reporting of the specific drum data and EPA generated concern ORNL-CCP-CH-RTR-001CR to address this issue.</p>

ATTACHMENT A.3: REAL-TIME RADIOGRAPHY (RTR) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

Inspection Date: November 13-15, 2007

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comments
				<p><u>ORNL-CCP-CH-RTR-001CR:</u></p> <p>When the templates used to complete Attachments 1 and 2 of CCP-TP-053 were opened during the on-site RTR demonstration, some of the questions were already answered. For example:</p> <ul style="list-style-type: none"> • Attachment 1, CCP RTR Measurement Control Report, had check marks indicating that the questions for “Video/Audio Recorded Media System Check” and “Image Test Pattern Test” were checked to indicate that they were “SAT” (satisfactory). • The entries to indicate the number of lines-pair/cm had already been filled in to indicate “25.” • Attachment 2, CCP Radiography Data Sheet,” Section 3, contained entries for “horsetail” and “plastic,” and the question “NCR(s) associated with the container?” was checked “No.” Even when the form was reset, the check marks did not disappear. <p><u>Objective evidence:</u></p> <ol style="list-style-type: none"> 1. RTR Batch Data Reports: OR-RTR6-001, OR-RTR6-003, OR-RTR6-007, (S5000, debris waste) 2. Audio/visual recording of RTR events for drums from the above BDRs
<p>RTR-3: The RTR procedure(s) require an image quality check to be performed.</p>	<p>CCP-TP-053, Revision 5, Section 4.3</p>	<ul style="list-style-type: none"> • Operator adequately explained how the acceptability of an image is determined. • Image quality (IQI) check is performed once 	<p>Y</p>	<p>CCP at ORNL does not have the capability to generate a linear diode array image (LDA). At the time of the on-site demonstration, the</p>

ATTACHMENT A.3: REAL-TIME RADIOGRAPHY (RTR) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

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Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comments
		<p>per day.</p> <ul style="list-style-type: none"> • LDA acceptability test performed at beginning of each shift. • Performance of the image quality check is documented and recorded. 		<p>operators had already completed the required audio/visual check. EPA reviewed this check to verify the written record and acceptability of the RTR image. As a further check, EPA reviewed Attachment 1, RTR Measurement Control Report, for all seven of the BDRs completed at the time of the inspection.</p> <p><u>Objective evidence:</u></p> <ol style="list-style-type: none"> 1. CCP-TP-053, Attachment 1, CCP RTR Measurement Control Reports, for all seven completed BDRs 2. CCP-TP-053, Attachment 2, CCP Radiography Data Sheet, for demonstration drum X10C0501308
<p>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.</p>	<p>CCP-TP-053, Revision 5, Section 4.4</p>	<ul style="list-style-type: none"> • 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). 	<p>Y</p>	<p>During the RTR demonstration, the operator adjusted the unit to maximize the image clarity. The RTR operators interviewed were knowledgeable and able to answer all questions asked by EPA. During the demonstration, the operator changed the Kv setting to accommodate the density of different materials and adjusted the unit as needed to obtain the clearest images of the waste items.</p> <p>The operators were able to explain the NCR process and in what circumstances an NCR would be initiated. EPA reviewed selected NCRs to ensure that they were complete and processed in accordance with site procedures.</p> <p><u>Objective evidence:</u></p> <ol style="list-style-type: none"> 1. RTR Batch Data Reports: OR-RTR6-001,

ATTACHMENT A.3: REAL-TIME RADIOGRAPHY (RTR) CHECKLIST

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Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comments
				OR-RTR6-003, OR-RTR6-007, (S5000, debris waste) 2. Nonconformance Reports (NCRs) NCR-ORNL-0101-07 and NCR-ORNL-0500-07
RTR-5:	CCP-TP-053, Revision 5, Section 4.3	<ul style="list-style-type: none"> • 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	<p>EPA compared the written record (BDR) and the audio/visual recordings for the following containers to ensure consistency:</p> <p>X10C0501101 X10C0501391 X10C0501179</p> <p>EPA did not identify any differences between the written and audio/visual records for these containers.</p> <p><u>Objective evidence:</u></p> <ol style="list-style-type: none"> 1. RTR Batch Data Reports: OR-RTR6-001, OR-RTR6-003, OR-RTR6-007 2. Audio/visual recordings for drums X10C0501101, X10C0501391, X10C0501179
RTR-6: There is a procedure for determining whether the waste matches the waste stream description and Waste Matrix Code, and for determining Waste Material Parameters and weights.	CCP-TP-053, Revision 5, Section 4.4, Table 3, Attachment 2	<ul style="list-style-type: none"> • The procedure is adequately implemented. • Operators verify that the waste matches the waste stream description. • Waste Matrix Code is verified. If not, corrective action is taken. • WMP weights are estimated by compiling an inventory of waste items and residual/packaging materials. • Does the RTR operator use a standard weight 	Y	<p>During the on-site demonstration, the operators scanned the container as required, using instructions contained in the procedure. WMPs were identified and entered electronically into a data sheet. At the end of the examination, the WMP weights were estimated and recorded. The procedure contains a table, Table 3, which provides standard weights for some items. The list is not comprehensive and the operator uses experience and training to assign the weights. During the demonstration, the operator also</p>

ATTACHMENT A.3: REAL-TIME RADIOGRAPHY (RTR) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

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Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comments
		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?		<p>“jogged” the drum to determine the presence/absence of free liquids.</p> <p>As part of the demonstration, the operator verified that the waste matched the waste stream description and the Waste Matrix Code. The absence/presence of prohibited items was recorded on the data sheet as part of the demonstration.</p> <p><u>Objective evidence:</u></p> <ol style="list-style-type: none"> 1. CCP-TP-053, Attachment 2, CCP Radiography Data Sheet, for demonstration drum X10C0501308 2. RTR Batch Data Reports: OR-RTR6-001, OR-RTR6-003, OR-RTR6-007 (S5000, debris waste) 3. Audio/visual recording of RTR events for drums from the above BDRs
RTR-7: The RTR procedure provides instructions for identifying prohibited items and for processing drums containing prohibited.	CCP-TP-053, Revision 5, Section 4.4, Table 1, Attachment 2	<ul style="list-style-type: none"> • 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. 		<p>The operators interviewed were able to answer all questions and were experienced in the performance of RTR examinations. During the demonstration, the operator also “jogged” the drum to determine the presence of free liquids. During the interview, the operators correctly stated when an NCR would be initiated.</p> <p><u>Objective evidence:</u></p> <ol style="list-style-type: none"> 1. RTR Batch Data Reports: OR-RTR6-001, OR-RTR6-003, OR-RTR6-007, (S5000, debris waste) 2. Nonconformance Reports (NCRs) NCR-ORNL-0101-07 and NCR-ORNL-0500-07

ATTACHMENT A.3: REAL-TIME RADIOGRAPHY (RTR) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

Inspection Date: November 13-15, 2007

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comments
<p>RTR-8: RTR procedures include the required QC examinations, evaluation accuracy and reproducibility of the RTR process.</p>	<p>CCP-TP-053, Revision 5, Sections 4.5, 4.6</p>	<ul style="list-style-type: none"> • 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). 	<p style="text-align: center;">Y</p>	<p>QC examinations were performed as required by the procedure. In batch OR-RTR6-001, an independent observation was performed on container X10C0501146 and a replicate scan was performed on container X10C0501144. In batch OR-RTR6-003, an independent observation was performed on container X10C0505973 and a replicate scan was performed on container X10C0506048. In batch OR-RTR6-007, an independent observation was performed on container X10C0501407 and a replicate scan was performed on container X10C0501270. The QC samples were performed by a different operator from the original event. Reconciliation of the QC results is only required if there is a difference between operators with regard to the Waste Matrix Code, liquids, and compressed gases (CCP-TP-053, Sections 4.5.3 and 4.6.3). EPA generated concern ORNL-CCP-CH-RTR-005C to address this issue.</p> <p><u>ORNL-CCP-CH-RTR-005C:</u></p> <p>The replicate and original scans that were performed in batch OR-RTR6-0003, Container X10C0506048, had a 15% difference in the percent fill factor, as well as minor differences in the recorded WMP weights. CCP-TP-053 only requires reconciliation of discrepancies when “identification of the waste matrix code, liquids in excess of TSDF-WAC limits and compressed gases differ between the two operators.” The same situation applies to the independent and original observations. While this practice complies with the requirements of CCP-TP-053, Sections 4.5.3 and 4.6.3, it does not satisfy EPA’s</p>

ATTACHMENT A.3: REAL-TIME RADIOGRAPHY (RTR) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

Inspection Date: November 13-15, 2007

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comments
				<p>requirement for a system of controls to demonstrate consistent and accurate identification of waste attributes. A tolerance needs to be defined for waste attributes.</p> <p><u>Objective evidence:</u></p> <p>1. RTR Batch Data Reports: OR-RTR6-001, OR-RTR6-003, OR-RTR6-007, (S5000, debris waste)</p>
<p>RTR-9: Procedure(s) contain standardized forms for recording RTR data.</p>	<p>CCP-TP-053, Revision 5, Attachment 1 and 2</p>	<ul style="list-style-type: none"> • 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	<p>EPA observed the operator complete the electronic data form (Attachment 2) for the demonstration drum X10C0501308. All entries were made as required. The entries were made at the time of the examination and signed by the operator performing the examination. Attachments 1 and 2 are printed and become part of the BDR, which undergoes both ITR and SPM level review.</p> <p><u>Objective evidence:</u></p> <p>1. RTR Batch Data Reports: OR-RTR6-001, OR-RTR6-003, OR-RTR6-007, (S5000, debris waste)</p>
<p>RTR-10: Site procedures require review of Batch Data Reports (BDRs) at the data generation and project level.</p>	<p>CCP-TP-053, Revision 5, Attachment 3 CCP-TP-001, Revision 17, Attachment 2</p>	<ul style="list-style-type: none"> • Data generation level reviews are performed and documented (ITR). • Project level reviews are performed and documented (SPM). 	Y	<p>All of the BDRs reviewed by EPA had been reviewed at both the generation (ITR) and project (SPM) level. The review checklists were complete and signed as required.</p> <p><u>Objective evidence:</u></p> <p>1. RTR Batch Data Reports: OR-RTR6-001, OR-RTR6-003, OR-RTR6-007, (S5000, debris waste)</p>

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	✓	Verification that waste matches waste stream description	✓	Container gross weight	✓
Report Date	✓	Estimated weights for Waste Material Parameters	✓	Reference to or copies of any NCRs	✓
Waste Container Number	✓	Layers of confinement	✓	Operator signature and test date	✓
Waste Matrix Code	✓	Indication of vented rigid liners	✓	Data generation checklist	✓
Videotape reference	✓	Description of container contents	✓	Project level checklist	✓
Description of liners	✓	Indication of sealed containers >4L	✓		
QC documentation	✓	Amount of free liquid	✓		

ATTACHMENT A.4: WIPP WASTE INFORMATION SYSTEM (WWIS) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

Inspection Date: November 13-15, 2007

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
WWIS-1: WWIS and Data Entry Personnel must be trained to assess data and properly enter data into the WWIS.	Y CCP-TP-030, Revision 22, Section 2.2; CCP-QP-002, Revision 25	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 WCA and WCO personnel includes the WIPP Waste Information System User's Manual and specific site training. WCO/WCAs are based in Carlsbad, New Mexico, where data entry into WWIS takes place. The training records contained in the personnel Qualification Card for a WCA/WCO were reviewed during the on-site inspection. The training was complete and appropriate for this position. <u>Objective evidence reviewed:</u> 1. Qualification Card for WCA and WCO
WWIS-2: Security measures for ensuring data integrity and accessing WWIS are sufficient.	Y CCP-TP-030, Revision 22, Section 4.1	Access to WWIS is controlled. WWIS access requests are recorded in an access log, however named, that is available for review.	Y	The WWIS Data Administrator controls access to WWIS. CCP requests access for personnel and the approval and password are transmitted to CCP via e-mail. The WWIS Data Administrator in Carlsbad, New Mexico, maintains the WWIS access log. <u>Objective evidence:</u> 1. List of Qualified Individuals for WWIS
WWIS-3: There are adequate procedures for entering data into the WWIS and transmitting data to WIPP.	Y CCP-TP-030 Revision 22, Section 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 and WWIS submission of data for all CCP sites takes place in Carlsbad, New Mexico. For the purpose of demonstration, a WCA/WCO was present at ORNL for this inspection. An Excel spreadsheet is used to enter characterization or certification data into WWIS. After completion, the spreadsheet is printed and reviewed. The initials of personnel entering and reviewing the spreadsheet data are recorded on the spreadsheet. By signing this summary, the WCO accepts the data for submission to WWIS. After the spreadsheet data have been approved by the WCO, flat files are generated and then uploaded into WWIS. All container NCRs must be closed prior to data entry. At the time of the on-site inspection, WWIS was not able to receive ORNL data, but the WCA/WCO interviewed was able to demonstrate the process using the Test Instance of

ATTACHMENT A.4: WIPP WASTE INFORMATION SYSTEM (WWIS) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

Inspection Date: November 13-15, 2007

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				WWIS. <u>Objective evidence reviewed:</u> 1. MS Excel 2000 and XP WWIS spreadsheet for container LA00000062113 2. Waste Container Data Report, container LA00000062113 3. MS Excel 2000 and XP WWIS spreadsheet for container 10086822 4. Waste Container Data Report, container 10086822
WWIS-4: Procedures require that only verified and validated data are entered into WWIS.	Y CCP-TP-030, Revision 22, Table 1	Data generation and project level reviews of container data for WWIS entry have been performed and review checklists are complete.	Y	At the time of the on-site inspection, WWIS was not able to receive ORNL data but the WCA/WCO interviewed was able to demonstrate the process. Only BDRs that have been through SPM review and reconciliation are eligible for WWIS data entry. <u>Objective evidence reviewed:</u> 1. MS Excel 2000 and XP WWIS spreadsheet for container LA00000062113 2. Waste Container Data Report, container LA00000062113 3. MS Excel 2000 and XP WWIS spreadsheet for container 10086822 4. Waste Container Data Report, container 10086822 5. RTR Batch Data Reports: OR-RTR6-001, OR-RTR6-003, OR-RTR6-007 (S5000, debris waste)
WWIS-5: Procedures include instructions for submission of data into the Characterization and the Certification module of WWIS.	Y CCP-TP-030 Revision 22, Sections 4.3 – 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,	Y	At the time of the on-site inspection, WWIS was not able to receive ORNL data, but the WCA/WCO interviewed was able to demonstrate the process. The CWA/WCO uploaded data into the Test Instance of WWIS, using both compliant and non-compliant data. To enable approval of a Waste

ATTACHMENT A.4: WIPP WASTE INFORMATION SYSTEM (WWIS) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

Inspection Date: November 13-15, 2007

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
		data are entered into the Certification module of WWIS.		Stream Profile Form (WSPF), CCP will upload ORNL data into the Characterization data module of WWIS. After WSPF approval, data will be submitted to the Certification module of WWIS. <u>Objective evidence reviewed:</u> <ol style="list-style-type: none"> 1. MS Excel 2000 and XP WWIS spreadsheet for container LA00000062113 2. Waste Container Data Report, container LA00000062113 3. MS Excel 2000 and XP WWIS spreadsheet for container 10086822 4. Waste Container Data Report, container 10086822
WWIS-6: Procedures include a requirement for review of data prior to submission to WWIS.	Y CCP-TP-030, Revision 22, Section 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	A WCA enters data and the data are checked by a second WCA. Prior to WWIS submittal, a WCO also reviews the data contained on the spreadsheet. WWIS contains checks that do not allow incorrect or unusable data to be uploaded. The initials of the reviewers are recorded on the Excel spreadsheet. If data are rejected by WWIS, CCP issues an NCR for the rejected data, makes the corrections, and resubmits the data to WWIS. <u>Objective evidence reviewed:</u> <ol style="list-style-type: none"> 1. MS Excel 2000 and XP WWIS spreadsheet for container LA00000062113 2. MS Excel 2000 and XP WWIS spreadsheet for container 10086822 3. NCR NCR-INL-0501-07
WWIS-7: There are adequate procedures for entering data into the WWIS and transmitting the data to	Y CCP-TP-030,	The site has successfully submitted characterization and certification data to WIPP	Y	CCP has successfully submitted characterization and certification data for many containers from other sites to WIPP via WWIS. The WCO was able to access multiple

ATTACHMENT A.4: WIPP WASTE INFORMATION SYSTEM (WWIS) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

Inspection Date: November 13-15, 2007

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
WIPP.	Revision 22, Section 4.0	via WWIS.		certified containers to demonstrate CCP's processes. <u>Objective evidence reviewed:</u> <ol style="list-style-type: none"> 1. MS Excel 2000 and XP WWIS spreadsheet for container LA00000062113 2. Waste Container Data Report, container LA00000062113 3. MS Excel 2000 and XP WWIS spreadsheet for container 10086822 4. Waste Container Data Report, container 10086822
WWIS-8: Procedures provide instructions for data correction if data are rejected by WWIS.	Y CCP-TP-030, Revision 22, Section 4.3-4.4	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. During the on-site demonstration the WCA/WCO entered non-compliant into the existing spreadsheet for a container and then tried to upload this into WWIS. WWIS rejected the container as required and provided information with regard to the reason for rejection. If data are rejected, an NCR is issued, the data corrected, and the container resubmitted to WWIS. <u>Objective evidence reviewed:</u> <ol style="list-style-type: none"> 1. MS Excel 2000 and XP WWIS spreadsheet for container LA00000062113 2. Waste Container Data Report, container LA00000062113 3. MS Excel 2000 and XP WWIS spreadsheet for container 10086822 4. Waste Container Data Report, container 10086822
WWIS-9: Procedures for waste container characterization/certification data submittal to WWIS require the	Y CCP-TP-030, Revision 22, Section 5.0	WWIS access requests WWIS access logs Waste container data input reports	Y	CCP was able to retrieve the records requested, including a list of qualified individuals, waste container data reports, and training records. <u>Objective evidence reviewed:</u>

ATTACHMENT A.4: WIPP WASTE INFORMATION SYSTEM (WWIS) CHECKLIST

EPA Inspection No.: EPA-ORNL-CCP-CH-11.07-8

Inspection Date: November 13-15, 2007

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
appropriate records to be retained.				<ol style="list-style-type: none"> 1. MS Excel 2000 and XP WWIS spreadsheet for container LA00000062113 2. Waste Container Data Report, container LA00000062113 3. MS Excel 2000 and XP WWIS spreadsheet for container 10086822 4. Waste Container Data Report, container 10086822 5. List of Qualified Individuals
WWIS-10:	NA	<p>Plans and procedures for payload management have been approved by CBFO.</p> <p>CBFO informed EPA prior to approving the site to payload- manage containers.</p> <p>TRU alpha activity concentration is > 100 nCi/g for the entire waste stream.</p> <p>Only waste containers from the same waste stream are payload managed in the same payload container.</p> <p>Each waste container selected for payload management contains at least one TRU isotope.</p> <p>TRU alpha activity concentration of the payload container is determined and reported.</p>	NA	At the time of the inspection, CCP/ORNL had not formally informed EPA of their intention to load-manage CH TRU waste at ORNL.

**WWIS Data Requirements
Characterization Module Data Fields
Partial List**

This table was not completed because ORNL data were not entered in WWIS at the time of the inspection.

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

Certification Module Data Fields

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

ATTACHMENT B.1: REPLICATE TESTING DATA FOR CONTAINER X10C0501112

Instrument: DWAS/IPAN/SGS

Container: X10C0501112

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)	3.51E-04	1.06E-04	3.03E-01	2.42E-04	7.31E-05	3.02E-01	2.51E-04	7.63E-05	3.04E-01
²³⁹ Pu Activity (Ci)	2.63E-03	7.06E-04	2.68E-01	1.82E-03	4.85E-04	2.67E-01	1.89E-03	5.07E-04	2.69E-01
²⁴⁰ Pu Activity (Ci)	9.43E-04	2.85E-04	3.03E-01	6.50E-04	1.96E-04	3.02E-01	6.75E-04	2.05E-04	3.04E-01
²⁴² Pu Activity (Ci)	2.23E-07	6.76E-08	3.03E-01	1.54E-07	4.65E-08	3.02E-01	1.60E-07	4.85E-08	3.04E-01
²⁴¹ Am Activity (Ci)	1.78E-03	5.40E-04	3.03E-01	1.23E-03	3.71E-04	3.02E-01	1.28E-03	3.88E-04	3.04E-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)	2.10E+02	5.76E+01	2.74E-01	1.45E+02	3.96E+01	2.73E-01	1.50E+02	4.14E+01	2.75E-01

Quantity of Interest	Replicate #3			Replicate #4			Replicate #5		
	Relative Uncertainty	Relative Uncertainty	Reported Value	Reported Value	Reported Value	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)	2.84E-04	8.49E-05	2.99E-01	3.39E-04	1.02E-04	3.01E-01	2.69E-04	8.04E-05	2.98E-01
²³⁹ Pu Activity (Ci)	2.13E-03	5.62E-04	2.64E-01	2.55E-03	6.76E-04	2.65E-01	2.02E-03	5.31E-04	2.63E-01
²⁴⁰ Pu Activity (Ci)	7.63E-04	2.28E-04	2.99E-01	9.11E-04	2.74E-04	3.01E-01	7.24E-04	2.16E-04	2.98E-01
²⁴² Pu Activity (Ci)	1.81E-07	5.40E-08	2.99E-01	2.16E-07	6.49E-08	3.01E-01	1.71E-07	5.11E-08	2.98E-01
²⁴¹ Am Activity (Ci)	1.44E-03	4.32E-04	2.99E-01	1.72E-03	5.18E-04	3.01E-01	1.37E-03	4.08E-04	2.98E-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)	1.70E+02	4.59E+01	2.70E-01	2.03E+02	5.52E+01	2.72E-01	1.61E+02	4.34E+01	2.69E-01

ATTACHMENT B.2: REPLICATE TESTING RESULTS FOR CONTAINER X10C0501112

Instrument: DWAS/IPAN/SGS
Container: X10C0501112

Quantity of Interest	Original Measurement		Sample Mean	Sample Standard Deviation	Relative Standard Deviation	χ^2	Pr(x < χ^2)
	Reported Value	Absolute Uncertainty					
²³³ U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!
²³⁴ U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!
²³⁸ U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!
²³⁸ Pu Activity (Ci)	3.51E-04	1.06E-04	2.77E-04	3.83E-05	1.38E-01	5.19E-01	9.72E-01
²³⁹ Pu Activity (Ci)	2.63E-03	7.06E-04	2.08E-03	2.87E-04	1.38E-01	6.63E-01	9.56E-01
²⁴⁰ Pu Activity (Ci)	9.43E-04	2.85E-04	7.45E-04	1.03E-04	1.38E-01	5.20E-01	9.72E-01
²⁴² Pu Activity (Ci)	2.23E-07	6.76E-08	1.76E-07	2.44E-08	1.38E-01	5.19E-01	9.72E-01
²⁴¹ Am Activity (Ci)	1.78E-03	5.40E-04	1.41E-03	1.95E-04	1.38E-01	5.19E-01	9.72E-01
⁹⁰ Sr Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!
¹³⁷ Cs Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!
TRU Alpha Conc. (nCi/g)	2.10E+02	5.76E+01	1.66E+02	2.29E+01	1.38E-01	6.33E-01	9.59E-01

Quantity of Interest	t	Pr(x < t)	χ^2 Test	t Test
²³³ U Activity (Ci)	N/A	N/A	#VALUE!	Not Applicable
²³⁴ U Activity (Ci)	N/A	N/A	#VALUE!	Not Applicable
²³⁸ U Activity (Ci)	N/A	N/A	#VALUE!	Not Applicable
²³⁸ Pu Activity (Ci)	1.76E+00	1.53E-01	Not Significant	Not Significant
²³⁹ Pu Activity (Ci)	1.76E+00	1.53E-01	Not Significant	Not Significant
²⁴⁰ Pu Activity (Ci)	1.76E+00	1.53E-01	Not Significant	Not Significant
²⁴² Pu Activity (Ci)	1.76E+00	1.53E-01	Not Significant	Not Significant
²⁴¹ Am Activity (Ci)	1.76E+00	1.53E-01	Not Significant	Not Significant
⁹⁰ Sr Activity (Ci)	N/A	N/A	#VALUE!	Not Applicable
¹³⁷ Cs Activity (Ci)	N/A	N/A	#VALUE!	Not Applicable
TRU Alpha Conc. (nCi/g)	1.76E+00	1.53E-01	Not Significant	Not Significant

ATTACHMENT B.3: REPLICATE TESTING DATA FOR CONTAINER X10C0501270

Instrument: DWAS/IPAN/SGS

Container: X10C0501270

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)	4.23E-04	1.22E-04	2.88E-01	3.68E-04	1.06E-04	2.88E-01	3.98E-04	1.15E-04	2.88E-01
²³⁹ Pu Activity (Ci)	3.17E-03	7.99E-04	2.52E-01	2.77E-03	6.94E-04	2.51E-01	2.99E-03	7.50E-04	2.51E-01
²⁴⁰ Pu Activity (Ci)	1.14E-03	3.28E-04	2.88E-01	9.90E-04	2.85E-04	2.88E-01	1.07E-03	3.08E-04	2.88E-01
²⁴² Pu Activity (Ci)	2.69E-07	7.76E-08	2.88E-01	2.34E-07	6.75E-08	2.88E-01	2.53E-07	7.30E-08	2.88E-01
²⁴¹ Am Activity (Ci)	3.11E-03	1.25E-03	4.02E-01	2.39E-03	7.52E-04	3.15E-01	4.26E-03	1.33E-03	3.12E-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)	4.31E+02	1.21E+02	2.81E-01	3.58E+02	9.37E+01	2.62E-01	4.79E+02	1.27E+02	2.65E-01

Quantity of Interest	Replicate #3			Replicate #4			Replicate #5		
	Relative Uncertainty	Relative Uncertainty	Reported Value	Reported Value	Reported Value	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)	3.90E-04	1.12E-04	2.88E-01	3.86E-04	1.11E-04	2.88E-01	4.15E-04	1.19E-04	2.88E-01
²³⁹ Pu Activity (Ci)	2.93E-03	7.35E-04	2.51E-01	2.90E-03	7.26E-04	2.51E-01	3.12E-03	7.81E-04	2.51E-01
²⁴⁰ Pu Activity (Ci)	1.05E-03	3.02E-04	2.88E-01	1.04E-03	2.98E-04	2.88E-01	1.12E-03	3.21E-04	2.88E-01
²⁴² Pu Activity (Ci)	2.48E-07	7.14E-08	2.88E-01	2.45E-07	7.07E-08	2.88E-01	2.64E-07	7.60E-08	2.88E-01
²⁴¹ Am Activity (Ci)	1.98E-03	5.71E-04	2.88E-01	1.96E-03	5.64E-04	2.88E-01	2.11E-03	6.07E-04	2.88E-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)	3.49E+02	8.99E+01	2.58E-01	3.45E+02	8.89E+01	2.58E-01	3.71E+02	9.56E+01	2.57E-01

ATTACHMENT B.4: REPLICATE TESTING RESULTS FOR CONTAINER X10C0501270

Instrument: DWAS/IPAN/SGS
Container: X10C0501270

Quantity of Interest	Original Measurement		Sample Mean	Sample Standard Deviation	Relative Standard Deviation	χ^2	Pr(x < χ^2)
	Reported Value	Absolute Uncertainty					
²³³ U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!
²³⁴ U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!
²³⁸ U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!
²³⁸ Pu Activity (Ci)	4.23E-04	1.22E-04	3.92E-04	1.71E-05	4.36E-02	7.83E-02	9.99E-01
²³⁹ Pu Activity (Ci)	3.17E-03	7.99E-04	2.94E-03	1.28E-04	4.36E-02	1.03E-01	9.99E-01
²⁴⁰ Pu Activity (Ci)	1.14E-03	3.28E-04	1.05E-03	4.59E-05	4.36E-02	7.83E-02	9.99E-01
²⁴² Pu Activity (Ci)	2.69E-07	7.76E-08	2.49E-07	1.09E-08	4.36E-02	7.84E-02	9.99E-01
²⁴¹ Am Activity (Ci)	3.11E-03	1.25E-03	2.54E-03	9.78E-04	3.85E-01	2.46E+00	6.52E-01
⁹⁰ Sr Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!
¹³⁷ Cs Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!
TRU Alpha Conc. (nCi/g)	4.31E+02	1.21E+02	3.80E+02	5.62E+01	1.48E-01	8.62E-01	9.30E-01

Quantity of Interest	t	Pr(x < t)	χ^2 Test	t Test
²³³ U Activity (Ci)	N/A	N/A	#VALUE!	Not Applicable
²³⁴ U Activity (Ci)	N/A	N/A	#VALUE!	Not Applicable
²³⁸ U Activity (Ci)	N/A	N/A	#VALUE!	Not Applicable
²³⁸ Pu Activity (Ci)	1.68E+00	1.69E-01	Not Significant	Not Significant
²³⁹ Pu Activity (Ci)	1.68E+00	1.69E-01	Not Significant	Not Significant
²⁴⁰ Pu Activity (Ci)	1.68E+00	1.69E-01	Not Significant	Not Significant
²⁴² Pu Activity (Ci)	1.67E+00	1.69E-01	Not Significant	Not Significant
²⁴¹ Am Activity (Ci)	5.26E-01	6.26E-01	Not Significant	Not Significant
⁹⁰ Sr Activity (Ci)	N/A	N/A	#VALUE!	Not Applicable
¹³⁷ Cs Activity (Ci)	N/A	N/A	#VALUE!	Not Applicable
TRU Alpha Conc. (nCi/g)	8.16E-01	4.60E-01	Not Significant	Not Significant

ATTACHMENT B.5: REPLICATE TESTING DATA FOR CONTAINER X10C0505990

Instrument: DWAS/IPAN/SGS
Container: X10C0505990

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)	5.36E-04	1.59E-04	2.96E-01	4.62E-04	1.35E-04	2.93E-01	4.63E-04	1.36E-04	2.92E-01
²³⁹ Pu Activity (Ci)	4.03E-03	1.05E-03	2.60E-01	3.47E-03	8.89E-04	2.56E-01	3.48E-03	8.91E-04	2.56E-01
²⁴⁰ Pu Activity (Ci)	1.44E-03	4.26E-04	2.96E-01	1.24E-03	3.63E-04	2.93E-01	1.25E-03	3.64E-04	2.92E-01
²⁴² Pu Activity (Ci)	3.41E-07	1.01E-07	2.96E-01	2.94E-07	8.60E-08	2.93E-01	2.95E-07	8.62E-08	2.92E-01
²⁴¹ Am Activity (Ci)	2.83E-03	1.03E-03	3.64E-01	2.02E-03	7.67E-04	3.80E-01	2.40E-03	7.16E-04	2.98E-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)	3.01E+02	8.27E+01	2.75E-01	2.45E+02	6.65E+01	2.72E-01	2.58E+02	6.80E+01	2.63E-01

Quantity of Interest	Replicate #3			Replicate #4			Replicate #5		
	Relative Uncertainty	Relative Uncertainty	Reported Value	Reported Value	Reported Value	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)	7.07E-04	2.06E-04	2.91E-01	4.32E-04	1.27E-04	2.94E-01	9.14E-04	2.68E-04	2.93E-01
²³⁹ Pu Activity (Ci)	5.31E-03	1.36E-03	2.56E-01	3.24E-03	8.37E-04	2.58E-01	6.86E-03	1.76E-03	2.57E-01
²⁴⁰ Pu Activity (Ci)	1.90E-03	7.07E-04	3.72E-01	1.16E-03	3.41E-04	2.94E-01	2.45E-03	7.20E-04	2.93E-01
²⁴² Pu Activity (Ci)	4.50E-07	1.31E-07	2.91E-01	2.75E-07	8.08E-08	2.94E-01	5.81E-07	1.70E-07	2.93E-01
²⁴¹ Am Activity (Ci)	3.60E-03	1.05E-03	2.92E-01	2.21E-03	7.55E-04	3.41E-01	4.73E-03	1.85E-03	3.91E-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)	3.92E+02	6.17E+01	1.57E-01	2.40E+02	6.48E+01	2.70E-01	5.09E+02	1.41E+02	2.76E-01

ATTACHMENT B.6: REPLICATE TESTING RESULTS FOR CONTAINER X10C0505990

Instrument: DWAS/IPAN/SGS
Container: X10C0505990

Quantity of Interest	Original Measurement		Sample Mean	Sample Standard Deviation	Relative Standard Deviation	χ^2	Pr(x < χ^2)
	Reported Value	Absolute Uncertainty					
²³³ U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!
²³⁴ U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!
²³⁸ U Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!
²³⁸ Pu Activity (Ci)	5.36E-04	1.59E-04	5.96E-04	2.10E-04	3.52E-01	6.97E+00	1.37E-01
²³⁹ Pu Activity (Ci)	4.03E-03	1.05E-03	4.47E-03	1.57E-03	3.52E-01	9.02E+00	6.05E-02
²⁴⁰ Pu Activity (Ci)	1.44E-03	4.26E-04	1.60E-03	5.63E-04	3.52E-01	6.97E+00	1.37E-01
²⁴² Pu Activity (Ci)	3.41E-07	1.01E-07	3.79E-07	1.33E-07	3.52E-01	6.97E+00	1.37E-01
²⁴¹ Am Activity (Ci)	2.83E-03	1.03E-03	2.99E-03	1.15E-03	3.85E-01	4.98E+00	2.90E-01
⁹⁰ Sr Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!
¹³⁷ Cs Activity (Ci)	0.00E+00	N/A	0.00E+00	0.00E+00	N/A	#VALUE!	#VALUE!
TRU Alpha Conc. (nCi/g)	3.01E+02	8.27E+01	3.29E+02	1.19E+02	3.61E-01	8.24E+00	8.31E-02

Quantity of Interest	t	Pr(x < t)	χ^2 Test	t Test
²³³ U Activity (Ci)	N/A	N/A	#VALUE!	Not Applicable
²³⁴ U Activity (Ci)	N/A	N/A	#VALUE!	Not Applicable
²³⁸ U Activity (Ci)	N/A	N/A	#VALUE!	Not Applicable
²³⁸ Pu Activity (Ci)	-2.59E-01	8.09E-01	Not Significant	Not Significant
²³⁹ Pu Activity (Ci)	-2.59E-01	8.09E-01	Not Significant	Not Significant
²⁴⁰ Pu Activity (Ci)	-2.59E-01	8.09E-01	Not Significant	Not Significant
²⁴² Pu Activity (Ci)	-2.59E-01	8.09E-01	Not Significant	Not Significant
²⁴¹ Am Activity (Ci)	-1.26E-01	9.06E-01	Not Significant	Not Significant
⁹⁰ Sr Activity (Ci)	N/A	N/A	#VALUE!	Not Applicable
¹³⁷ Cs Activity (Ci)	N/A	N/A	#VALUE!	Not Applicable
TRU Alpha Conc. (nCi/g)	-2.16E-01	8.40E-01	Not Significant	Not Significant

ATTACHMENT C.1

INSPECTION ISSUE TRACKING FORM, ISSUE NO. ORNL-CCP-CH-RTR-07-001CR, FINAL

Inspection No. EPA-ORNL-CCP-CH-11.07-8	Issue Number: ORNL-CCP-CH-RTR-07-001CR, Final Date: November 14, 2007
Inspector: Dorothy E Gill Attachments? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	Sample Size: Not Applicable Population size (if known): Not Applicable
<p>Description of Issue: When the templates used to complete Attachments 1 and 2 of CCP-TP-053 were opened during the on-site RTR demonstration some of the questions were already answered. For example:</p> <ul style="list-style-type: none"> • Attachment 1, CCP RTR Measurement Control Report, had check marks indicating that the questions for “Video/Audio Recorded Media System Check” and “Image Test Pattern Test” were checked to indicate that they were “SAT” (satisfactory). • The entries to indicate the number of lines-pair/cm had already been filled in to indicate “25”. • Attachment 2, CCP Radiography Data Sheet”, Section 3 contained entries for “horsetail” and “plastic” and the question “NCR(s) associated with the container?” was checked “No”. Even when the form was reset the check marks did not disappear. 	
B. Regulatory Reference: 40 CFR 194.24(c)	
C. Site requirement(s):	
D. Discussed with: Susan Smith and Lee Smith	
E. Additional Comments:	
<p>F. Site Response Information:</p> <p>Site Response Required? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO Site Response Due Date: December 10, 2007</p>	

ATTACHMENT C.2

INSPECTION ISSUE TRACKING FORM, ISSUE NO. ORNL-CCP-CH-NDA-07-002CR, FINAL

Inspection No. EPA-ORNL-CCP-CH-11.07-8	Issue Number: ORNL-CCP-CH-NDA-07-002CR, Final Date: November 14, 2007
Inspector: P. Kelly Attachments? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	Sample Size: NA (single document) Population size (if known): NA
<p>Description of Issue: The SGS calibration report MV-SGS0101-CAL-01, Revision 0 did not adequately document calibration of this NDA system. The EPA inspector could not determine the adequacy of this instrument's calibration on the basis of the calibration report alone. As a result of interviewing NDA personnel during the inspection the SGS calibration was determined to be technically adequate. In general, the report's overall quality is lacking with respect to organization and attention to technical details. Examples include:</p> <ul style="list-style-type: none"> • SGS-01 Calibration Qualification Summary does not state the system's operating range with respect to matrix (sample density) nor does the section on <u>Matrix Drums</u> (Section 3) adequately document the system's capabilities in this area • SGS-01 Calibration Qualification Summary does not list the use of default (AK) isotopics as an option (19 of the 20 drums assayed to date have used AK isotopics) • The document is unclear regarding whether this system will be used to sort TRU/Non-TRU wastes in accordance with the 100 nCi/g criterion • Descriptions of the system's calibration of record do not accurately document what happened <p>EPA expects this document to be revised as discussed during the inspection.</p>	
B. Regulatory Reference: 40 CFR 194.24(c)	
C. Site requirement(s):	
D. Discussed with: Joe Harvill, Joe Wachter, George Westik, John West, Barry Smith, Christa Chavez	
E. Additional Comments:	
<p>F. Site Response Information:</p> <p>Site Response Required? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO Site Response Due Date: December 10, 2007</p>	

ATTACHMENT C.3

INSPECTION ISSUE TRACKING FORM, ISSUE NO. ORNL-CCP-CH-CBFO-07-003F, FINAL

Inspection No. EPA-ORNL-CCP-CH-11.07-8	Issue Number: ORNL-CCP-CH-CBFO-07-003F, Final Date: November 14, 2007
Inspector: E. Feltcorn /R.Joglekar/M. Eagle Attachments? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	Sample Size: Not Applicable Population size (if known): Not Applicable
<p>Description of Issue: EPA finds that the ORNL-CCP was not adequately prepared for the EPA Baseline Inspection for several technical areas. Examples include:</p> <ul style="list-style-type: none"> • NDA - EPA found the SGS Calibration Report was not adequate as documented in EPA Finding ORNL-CCP-CH-NDA-07-002CR • RTR - Records (RTR and DVDs) needed to support the inspection were not available at the beginning of the inspection • AK - The AK Summary that was provided had insufficient detail. Information that should have been assessed and integrated in the document was available to the AKE and was identified during the inspection. It was clear that continued development of the document was anticipated in the near future to integrate additional information • WWIS - The WCA/WCO who demonstrated the WWIS to the EPA inspector was not a qualified WCA/WCO for ORNL-CCP. 	
B. Regulatory Reference: 40 CFR 194.8 and 40 CFR 24	
C. Site requirement(s):	
D. Discussed with: Court Fesmire, Bob Billett	
E. Additional Comments: EPA expects the response to this finding will be coordinated between CBFO and CCP management.	
<p>F. Site Response Information:</p> <p>Response Required? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO Response Due Date: December 10, 2007</p>	

ATTACHMENT C.4

INSPECTION ISSUE TRACKING FORM, ISSUE NO. ORNL-CCP-CH-RTR-07-004C, FINAL

Inspection No. EPA-ORNL-CCP-CH-11.07-8	Issue Number: ORNL-CCP-CH-RTR-07-004C, Final Date: November 15, 2007
Inspector: Dorothy E Gill Attachments? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Sample Size: Not Applicable Population size (if known): Not Applicable
Description of Issue: In the capability demonstration training containers the EPA inspector noted that while all the required items (prohibited items) were identified correctly by all RTR operators, some additional items (cellulosics and plastics) were not identified. All cellulosics and plastics in the training drum need to be identified and their identification documented. To complete the training process it is critical that the operator receives feedback regarding missed items. More detailed documentation of the feedback given is needed when the results of the training drum are reviewed.	
B. Regulatory Reference: 40 CFR 194.24(c)	
C. Site requirement(s):	
D. Discussed with: Susan Smith, Lee Smith	
E. Additional Comments: Copies of the Attachment 3s for the four qualified RTR operators are attached for information purposes.	
F. Site Response Information: Site Response Required? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO Site Response Due Date: NA	

ATTACHMENT C.5

INSPECTION ISSUE TRACKING FORM, ISSUE NO. ORNL-CCP-CH-RTR-07-005C, FINAL

Inspection No. EPA-ORNL-CCP-CH-11.07-8	Issue Number: ORNL-CCP-CH-RTR-07-005C, Final Date: November 14, 2007
Inspector: D. Gill Attachments? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	Sample Size: Not Applicable Population size (if known): Not Applicable
<p>Description of Issue: The replicate and original scans that were performed in batch OR-RTR6-0003, Container X10C0506048, had a 15% difference in the percent fill factor as well as minor differences in the recorded WMP weights. CCP-TP-053 only requires reconciliation of discrepancies when “identification of the waste matrix code, liquids in excess of TSDf-WAC limits and compressed gases differ between the two operators”. The same situation applies to the independent and original observations. While this practice complies with the requirements of CCP-TP-053, Sections 4.5.3 and 4.6.3, it does not satisfy EPA’s requirement for a system of controls demonstrating consistent and accurate identification of waste attributes. A tolerance needs to be defined for waste attributes.</p>	
<p>B. Regulatory Reference: 40 CFR 194.24(c)</p>	
<p>C. Site requirement(s):</p>	
<p>D. Discussed with: Susan Smith, Lee Smith</p>	
<p>E. Additional Comments:</p>	
<p>F. Site Response Information:</p> <p>Site Response Required? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO Site Response Due Date: NA</p>	

ATTACHMENT C.6

INSPECTION ISSUE TRACKING FORM, ISSUE NO. ORNL-CCP-CH-NDA-07-006CR, FINAL

Inspection No. EPA-ORNL-CCP-CH-11.07-8	Issue Number: ORNL-CCP-CH-NDA-07-006CR, Final Date: November 14, 2007
Inspector: P. Kelly Attachments? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	Sample Size: Not Applicable Population size (if known): One report
Description of Issue: The calibration report for the DWAS IPAN NDA system BII-5183-CVR-001, Revision 2, Section 5.4, Table 12, <i>LLD Implementation</i> , does not address the LLD determination for two of the ten WIPP-tracked radionuclides, ²³⁴ U and ⁹⁰ Sr. Inclusion of LLDs is required by CCP-TP-167, Section 4.6.1 but the report is silent regarding the LLD determination for these two radionuclides.	
B. Regulatory Reference: 40 CFR 194.24(c)	
C. Site requirement(s): CCP-PO-002, CCP Transuranic Waste Certification Plan	
D. Discussed with: John West, Joe Harvill, Joe Wachter, George Westsik, Barry Smith, Christa Chavez	
E. Additional Comments: CCP-TP-168, Section 4.1, Note references the NDA Memorandum with regard to the LLDs for ²³⁴ U and ⁹⁰ Sr. The LLD determinations for ²³⁴ U and ⁹⁰ Sr are addressed appropriately in the SGS calibration report.	
F. Site Response Information: Site Response Required? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO Site Response Due Date: December 10, 2007	

ATTACHMENT C.7

INSPECTION ISSUE TRACKING FORM, ISSUE NO. ORNL-CCP-CH-AK-07-007CR, FINAL

Inspection No. EPA-ORNL-CCP-CH-11.07-8	Issue Number: ORNL-CCP-CH-AK-07-007CR, Final Date: November 14, 2007
Inspector: C. Walker Attachments? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	Sample Size: DR002 Population size (if known): single discrepancy report
Description of Issue: Discrepancy Report DR002 identifies several discrepancies, but resolution of these discrepancies is incomplete. For example, resolutions are required to address ²³⁵ U and ²³⁸ U discrepancies between NFS and TWPC NDA data, detection of ²²⁸ Th and ²³² Th, isotopic inconsistencies (e.g., Halden, SRO), and inconsistencies regarding the occurrence of ²³⁸ U and ²³⁵ U enrichment with respect to SRO material. Resolution of these issues could result in changes to the AK-NDA memorandum and revisions to the AK Summary for waste stream ORNL-NFS-CH-HET.	
B. Regulatory Reference: 40 CFR 194.24(c)	
C. Site requirement(s): CCP-TP-005, Section 4.9.10 (additional sections also apply)	
D. Discussed with: Jeff Harrison and Dave Adkins	
E. Additional Comments:	
F. Site Response Information:	
Site Response Required? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO Site Response Due Date: December 10, 2007	

ATTACHMENT C.8

INSPECTION ISSUE TRACKING FORM, ISSUE NO. ORNL-CCP-CH-AK-07-008CR, FINAL

Inspection No. EPA-ORNL-CCP-CH-11.07-8	Issue Number: ORNL-CCP-CH-AK-07-008CR, Final Date: November 14, 2007
Inspector: C. Walker Attachments? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	Sample Size: Document CCP-AK-ORNL-001 Population size (if known): One AK Summary Report
<p>Description of Issue: AK Summary CCP-AK-ORNL-001 lacks detail with respect to technical issues that could impact AK waste characterization. Examples of technical areas that need additional information include:</p> <ul style="list-style-type: none"> • Occurrence, source, and potential distribution of ²³³U • AK Summary conclusions and the development of default isotopic distribution values • Consistency of isotopic and other information with respect to AK-NDA memo information • Examination and updating of document to include relevant information from references such as U044 that has not been added to the AK reference list or addressed in the AK Summary • Additional process information (e.g., MOX generation) • Addition of references included in the AK-NDA memo • Additional changes based on assessment and integration of AK data including changes required due to Discrepancy Resolution (ORNL-CCP-CH-AK-07-007CR) and AK-NDA Memo (ORNL-CCP-CH-AK-07-009CR). 	
B. Regulatory Reference: 40 CFR 194.24(c)	
C. Site requirement(s): CCP-TP-005, Revision 18	
D. Discussed with: Jeff Harrison and Dave Adkins	
E. Additional Comments: The AKE has indicated that additional revisions to the AK Summary are anticipated based on receipt of new AK source documents, and the above technical issues and other corresponding revisions may be accomplished.	
<p>F. Site Response Information:</p> <p>Site Response Required? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO Site Response Due Date: December 10, 2007</p>	

ATTACHMENT C.9

INSPECTION ISSUE TRACKING FORM, ISSUE NO. ORNL-CCP-CH-AK-07-009CR, FINAL

Inspection No. EPA-ORNL-CCP-CH-11.07-8	Issue Number: ORNL-CCP-CH-AK-07-009CR, Final Date: November 14, 2007
Inspector: C. Walker Attachments? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	Sample Size: CCP-TP-005 Revision 18, Attachment 7 AK NDA Memo Population size (if known): One AK-NDA Memo
Description of Issue: The AK-NDA memo included in CCP-TP-005 Attachment 7 does not specify how the AK data will be used by NDA personnel. The manner in which NDA personnel will use the AK data should be specified in the AK-NDA memo or by reference to the appropriate NDA procedure. The AK-NDA memo needs to incorporate applicable components of the responses addressing EPA Issue Nos. ORNL-CCP-CH-AK-07-007CR and ORNL-CCP-CH-AK-07-008CR to convey to NDA personnel resultant changes.	
B. Regulatory Reference: 40 CFR 194.24(c)	
C. Site requirement(s): CCP-TP-005, Revision 18, Section 4.4.22	
D. Discussed with: Jeff Harrison and Dave Adkins	
E. Additional Comments:	
F. Site Response Information: Site Response Required? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO Site Response Due Date: December 10, 2007	