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WASTE CHARACTERIZATION INSPECTION REPORT
EPA BASELINE INSPECTION NO. EPA-ANL-CCP-RH-9.06-8
OF THE CENTRAL CHARACTERIZATION PROJECT
REMOTE-HANDLED TRANSURANIC WASTE CHARACTERIZATION
PROGRAM AT THE ARGONNE NATIONAL LABORATORY
September 12-14, 2006

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

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ATTACHMENTS

- Attachment A.1 Acceptable Knowledge (AK) Checklist
- Attachment A.2 Dose To Curie (DTC) Checklist
- Attachment A.3 Visual Examination (VE) Checklist

- Attachment B.1 EPA Inspection Issue Tracking Form, EPA Issue No. ANL-CCP-RH-VE-06-001CR
- Attachment B.2 EPA Inspection Issue Tracking Form, EPA Issue No. ANL-CCP-RH-VE-06-002C
- Attachment B.3 EPA Inspection Issue Tracking Form, EPA Issue No. ANL-CCP-RH-AK-06-003C

- Attachment C Public Comments and EPA's Responses

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-ANL-CCP-RH-9.06-8 of the Central Characterization Project's (CCP) waste characterization (WC) program for remote-handled (RH) transuranic (TRU) waste at the U.S. Department of Energy's (DOE) Argonne National Laboratory (ANL), also known as Argonne National Laboratory East (ANLE), located in Argonne, Illinois. EPA conducted a baseline inspection of the ANL-CCP's program to characterize RH TRU wastes proposed for disposal in the Waste Isolation Pilot Plant (WIPP). The inspection activities described in this report occurred September 12-14, 2006.

On November 2006, EPA issued a Federal Register (FR) notice (71 FR 65488, November 8, 2006) announcing the proposed approval of the RH WC program implemented at ANL by CCP. The FR notice opened a 45-day comment period to solicit public comment on the proposed approval of ANL-CCP's RH WC program and the ANL Baseline Inspection Report (EPA Air Docket A98-49, II-A4-70). The comment period ended December 26, 2006. EPA received one set of public comments. (See EPA Docket ID No. EPA-HQ-OAR-2006-0881). EPA evaluated and responded to the public comments (see Attachment C of this report), and made changes to the proposed approval decision, where appropriate. This report discusses EPA's approval of the RH WC program implemented at ANL by CCP.

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 *Federal Register* (FR) 27354 and 27405, May 18, 1998). This was the first inspection of RH WC activities conducted by EPA at ANL-CCP. EPA Baseline Inspection No. EPA-ANL-CCP-RH-9.06-8 was performed in accordance with the provisions of 40 CFR 194.8(b), as issued in a July 16, 2004, FR notice (Vol. 69, No. 136, pp. 42571–42583). The purpose of the ANL-CCP RH WC inspection was to evaluate the adequacy of the site's WC programs for one RH debris waste (S5000) stream to be disposed of at the WIPP. The activities examined during the inspection included the following:

- Acceptable knowledge (AK) for RH retrievably-stored TRU debris waste (S5000)
- Visual examination (VE) for RH retrievably-stored TRU debris waste (S5000)
- Radiological characterization as described in this report for RH retrievably-stored TRU debris waste (S5000)

EPA's inspection team determined that ANL-CCP's RH WC program activities were technically adequate. EPA is therefore, approving the ANL-CCP RH WC program in the configuration observed during this inspection, described in this report, and documented in detail in the checklists in Attachment A. The approval includes the following:

- (1) The AK process for RH retrievably-stored TRU debris in one waste stream, Argonne National Laboratory Waste Stream AERHDM, as defined in CCP-AK-ANLE-500, Revision 1, July 18, 2006

- (2) The radiological characterization process using Dose-to-Curie (DTC) and modeling-derived scaling factors for assigning radionuclide values to one RH waste stream for which the scaling factors are applicable, as described in CCP-AK-ANL-501, Revision 0
- (3) The VE process for one retrievably-stored RH S5000 debris waste stream AERHDM using the trained personnel, documentation, and procedures discussed in this report

EPA is not approving the WIPP Waste Information System (WWIS) for entry and tracking of the waste contents of RH debris wastes at this time. Although the WWIS is currently approved by EPA for tracking contact-handled (CH) waste, ANL-CCP had not demonstrated its adequacy to enter and track RH waste contents during this baseline inspection. During the comment period for the proposed approval the Carlsbad Area Field Office (CBFO) notified EPA that the WWIS was operational for RH wastes and was ready for EPA evaluation as a Tier 1 (T1) change. EPA has begun this evaluation and the results of EPA's T1 evaluation will be provided upon completion separately.

EPA is not approving Real Time Radiography (RTR) at ANL-CCP. ANL-CCP did not have an operational RTR unit in place at the time of the inspection. ANL-CCP cannot ship RH waste to WIPP using RTR as a WC technique until it is inspected and approved by EPA.

Any changes to the WC activities from the date of the baseline inspection must be reported to and, if applicable, approved by EPA, according to Table 1. Please note that each T1 and Tier 2 (T2) change listed in Table 1 is followed by a reference to the report section where the technical basis for the T1 or T2 designation is presented.

EPA will notify the public of the results of its evaluations of T1 and T2 changes established as part of today's approval through the EPA Web site and by sending e-mails to the WIPPNEWS list (see Section 2.0, below, for a brief discussion of tiering). All T1 changes must be submitted for approval before their implementation and will be evaluated by EPA. Upon approval, EPA will post the results of the evaluations through the EPA Web site and the WIPPNEWS list, as described above.

In October 2006, EPA concurred with CBFO's request for allowing INL-CCP to submit T2 changes implemented at the EPA-approved TRU sites four times a year at the end of each fiscal quarter. (See EPA letter to CBFO dated October 26, 2006; EPA Air Docket No. A-98-49, II-A4-76). ANL-CCP may submit all T2 changes discussed in this report on the same schedule.

**Table 1. Tiering of RH TRU WC Processes Implemented by ANL-CCP
(Based on September 12–14, 2006 Baseline Inspection)**

RH WC Process Elements	ANL-CCP RH WC Process - T1 Changes	ANL-CCP RH WC Process - T2 Changes*
Acceptable Knowledge (AK)	<p>Any new waste streams not approved under this baseline; AK (1)</p> <p>Modification of the approved waste stream AERHDM to include additional containers beyond the approximately 45 included in CCP-AK-ANLE-500, Revision 1. The 20 <i>additional</i> containers identified in the AK summary as being present are not included in this waste stream approval; AK (1)</p> <p>Substantive modification(s)*** that have the potential to affect the characterization process to CCP-AK-ANLE-500, CCP-AK-ANLE-501 or CCP-AK-ANLE-502; AK (8)</p> <p>Implementation of load management for any RH waste stream; AK (16)</p>	<p>Notification to EPA that the final DTC determination is complete for RH containers in the approved waste stream; AK (3)</p> <p>Notification to EPA when updates are made to AK documentation as a result of WCPIP revisions**; AK (4)</p> <p>Notification that updates have been completed to the following documents:</p> <ul style="list-style-type: none"> • All future revisions of CCP-ANLE-AK-500, CCP-ANLE-AK-501; AK (4) • Listing of the references that document the assembly of fuel pin data and review process; AK (5) • All future revisions of CCP-ANLE-AK-502; AK (8) • CCP-AK-ANLE-500 and CCP-AK-ANLE-502 to address freeze file changes; AK (8) <p>Notification to EPA that the data package for this debris waste stream is completed, including any modifications to the WSPF including the CRR and AK Summary; AK (9), and AK (14)</p> <p>Notification to EPA when AK accuracy reports are completed, prepared annually at a minimum; AK (15)</p>
Radiological Characterization, including Dose-To-Curie (DTC)	<p>Use of any alternate radiological characterization procedure other than DTC with established scaling factors as documented in CCP-TP-504 and CCP-AK-ANLE-501, Revision 0, respectively, or substantive modification thereof***; RC (8.2.2 and 8.2.3)</p> <p>Any new waste stream not approved under this baseline or addition of containers to waste stream AERHDM that require changing the established radionuclide scaling factors; RC (8.2.3)</p> <p>Application of new scaling factors for isotopic determination other than those documented in CCP-AK-ANLE-501; RC (8.2.2 and 8.2.3)</p>	<p>Notification to EPA that revisions of CCP-AK-ANLE-501 or CCP-TP-504 that require CBFO approval** are complete; RC (8.2.2 and 8.2.3)</p>

**Table 1. Tiering of RH TRU WC Processes Implemented by ANL-CCP
(Based on September 12–14, 2006 Baseline Inspection)**

RH WC Process Elements	ANL-CCP RH WC Process - T1 Changes	ANL-CCP RH WC Process - T2 Changes*
Visual Examination (VE)	VE by reviewing existing audio/visual recordings for Summary waste category not covered by this approval; VE (1) & VE (3) VE by any new process for S5000 debris wastes; VE (1) and VE (3)	Notification to EPA that revisions of any VE procedure that require CBFO approval are complete; VE (1) and VE (3) Addition of new S5000 debris waste streams; VE (2)
Real Time Radiography (RTR)	Any use of RTR requires EPA approval	None
WIPP Waste Information System (WWIS)	Any use of WWIS requires EPA approval prior to RH waste disposal	None

* ANL-CCP will report all T2 changes to EPA every three months.

** Excluding changes that are editorial in nature or are required to address administrative concerns. New references that are included as part of the document revision may be requested by EPA.

*** *Substantive modification* refers to a change with the potential to affect ANL's RH WC process, e.g., the use of an inherently different type of measurement instrument or the use of the high range probe as described for CCP-TP-504 for radiological characterization.

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 No. 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 (CCA).

Under the changes to 40 CFR 194.8 promulgated in the July 16, 2004, FR notice, EPA must perform a single baseline inspection of each TRU waste generator site’s WC program. The purpose of the baseline inspection is to approve the site’s WC program based on the 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 inspection team conducts an onsite inspection to verify that the site’s system of controls is technically adequate and properly implemented. Specifically, EPA’s 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 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. By approving the WC systems and processes at ANL-CCP, EPA has evaluated the capabilities of systems and processes to accomplish two tasks: (1) the identification and

¹ As of the FR notice of July 16, 2004, 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.”

measurement of waste components (such as plutonium) that must be tracked for compliance,³ and (2) the confirmation 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 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 (both announced and unannounced) to verify that the site continues to use only the approved WC processes to characterize the waste, and that those WC processes remain in compliance with all the applicable 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. This will be accomplished by assigning a tier level to each aspect of the characterization program, i.e., T1 and T2 activities. T1 activities have more stringent reporting requirements and require that DOE notify EPA of proposed T1 changes prior to implementation, and that EPA provide approval prior to implementation. T2 activities are reported to EPA by DOE based on the frequency established in the inspection report. DOE may choose to characterize and dispose of at risk while EPA considers the proposed T2 changes.

If ANL-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 a possibility of EPA not approving the site-assigned tiers. The rule under which this baseline inspection was conducted can be found in the FR (Vol. 69, No. 136, pp. 42571–42583, July 16, 2004).

3.0 PURPOSE OF THIS REPORT

This report documents the basis for EPA's approval decision, and explains the results of Baseline Inspection No. EPA-ANL-CCP-RH-9.06-8 in terms of findings or concerns. Specifically, this report does the following:

- Describes the characterization systems for approval
- Provides objective evidence of the approval basis for all WC systems
- Identifies all relevant limitations and/or conditions for each WC system
- Provides objective evidence of findings or concerns in the form of documentation, as applicable

³ The potential contents of a single or group of waste streams determine which processes can adequately characterize the waste. For example, if AK suggests that the waste form is heterogeneous, the site should select the matrix-appropriate radiological characterization technique to obtain adequate radionuclide measurements. VE serves to confirm and quantify non-radiological waste components, such as cellulose, rubbers, plastics, and metals. Once the nature of the waste has been confirmed, characterization techniques will be applied to quantify selected radionuclides in the waste. In some cases, a TRU waste generator site may be able to characterize a range of heterogeneous waste streams or only a few. A site's stated limits on the applicability of proposed WC processes govern the scope of EPA's inspection.

- Describes any tests or demonstrations completed during the course of the inspection and their relevance to EPA's approval decision

The completed checklists attached to this report in conjunction with the listings in each section, reference the documents that the EPA inspection team members reviewed in support of the technical determination. To see or obtain copies of any items identified in the attached checklists, write to the following address:

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

EPA's final approval of the ANL-CCP RH WC program is conveyed to DOE separately by letter. This information is also available on EPA's Web site at <http://www.epa.gov/radiation/WIPP>, in accordance with 40 CFR 194.8(b)(3).

4.0 SCOPE OF INSPECTION

The scope of Baseline Inspection No. EPA-ANL-CCP-RH-9.06-8 included the technical adequacy of the WC systems in use at ANL-CCP to characterize RH TRU wastes. These systems were evaluated with respect to their ability to perform the following:

- 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 radiological characterization, including DTC and radionuclide scaling factors derived from modeling
- Assign waste material parameters (WMPs) correctly and confirm the presence or absence of prohibited items using VE for RH retrievably-stored debris waste

Specifically, these systems consisted of the following components:

- The AK process that supports retrievably-stored S5000 debris wastes from one RH debris waste stream, Argonne National Laboratory Waste Stream No. AERHDM
- The system of radiological characterization including DTC and the application of radionuclide scaling factors derived by modeling for one RH debris waste stream, Argonne National Laboratory Waste Stream No. AERHDM
- VE for retrievably-stored S5000 RH debris wastes

During an inspection, EPA does not approve characterization data; that function is the sole responsibility of the WC organization being evaluated during the inspection, in this case ANL-CCP. EPA evaluated the WC processes implemented by the site to characterize RH retrievably-stored debris. The evaluation consisted of interviewing personnel, observing equipment operations that are controlled through site procedures, and inspecting records related to each of the WC processes within the inspection's scope. An important aspect of this evaluation is the objective evidence that documents the effectiveness of the WC processes.

Objective evidence typically takes the form of batch data reports (BDRs) for radiological characterization and VE; AK Summaries and accuracy reports; and VE tapes. During an inspection, EPA typically selects samples of each of these items, based on the number and variety of items that were completed and available for each WC process, consistent with standard auditing techniques. Due to the newness of the RH TRU characterization program, there was only one completed BDR for VE and radiological characterization available for the EPA inspection team’s evaluation. Due to the limited number of BDRs, the EPA inspection team evaluated one hundred percent of the drums in this package rather than choose a subset (sample) from a population of completed BDRs. Based on the evaluation of the WC processes in conjunction with the objective evidence, EPA determined the technical adequacy of the WC processes within the inspection’s scope.

5.0 INSPECTION-RELATED DEFINITIONS

During the course of 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: Concerns not requiring a response do not have to be addressed prior to program approval. However, EPA recommends that when DOE accepts the site’s response addressing the issue raised in the EPA concern, EPA should be informed concurrently with implementation of the corrective action in response to the concern, similar to a T2 issue.

6.0 PERSONNEL

6.1 EPA Inspection Team

The members of the EPA WC inspection team are identified below.

Table 2. EPA Inspection Team Members

Inspection Team Member	Position	Affiliation
Mr. Ed Feltcorn	Inspection Team Leader	U.S. EPA ORIA
Ms. Rajani Joglekar	Inspector	U.S. EPA ORIA
Ms. Lisa Sharp	Observer	U.S. EPA ORIA
Ms. Connie Walker	Inspector	S. Cohen & Associates, Inc.
Ms. Dorothy Gill	Inspector	S. Cohen & Associates, Inc.
Mr. Patrick Kelly	Inspector	S. Cohen & Associates, Inc.

6.2 Personnel Contacted

The EPA inspection team conducted interviews with ANL-CCP personnel in several disciplines. The personnel contacted represented a sample of the RH TRU WC staff, and they are listed in the table below, along with their affiliation and technical area.

Table 3. Personnel Contacted During Inspection

Personnel	Affiliation	Area of Expertise
Eric D'Amico	CCP	AK, DTC, SPM
Jene Vance	CCP	AK, AKE/DTC; Scaling Factors
A.J. Fisher	CCP	SPQAO
Lisa Price	CCP	AK, AKE
Larry Porter	CCP	AK, VE SPM; Scaling Factors
Steve Schafer	CCP	AK, AKE
Jeff Harrison	CCP	AK, AKE
Kevin Peters	CCP	AK, AKE
Ed Gulbransen	CCP	DTC, SME
Mark Doherty	CCP/WTS	DTC & Scaling Factors
Joe Harvill	CCP/WTS	DTC & Scaling Factors
Tommy Mojica	CCP	Operator/ITR, SME/OJT, VEE
Gloria Ruppert	CCP	Operator/ITR
Gary Redman	CCP	Operator/ITR
Irene Quintana	WTS	SPM
Wes Root	CCP	VE, VPM

During the baseline inspection, ANL-CCP provided a list of RH TRU WC personnel from which EPA selected the individuals to be interviewed. The EPA inspectors reviewed the qualifications and training records of these individuals relative to their WC responsibilities. Based on this evaluation, EPA determined that ANL-CCP WC personnel responsible for characterizing RH TRU waste and certifying it as TRU waste were qualified and had received adequate training to perform their assigned function. If key WC personnel changes occur, EPA may request qualification and training records of the new individuals identified as key WC personnel. EPA will review these records and may interview the personnel to determine their abilities to produce quality data. This personnel qualification evaluation and review of training records would be the equivalent of the evaluation done by the EPA inspection team on site during this inspection.

7.0 PERFORMANCE OF THE INSPECTION

Site Background and History

ANL is located in Argonne, Illinois, approximately 22 miles southwest of downtown Chicago and 25 miles west of Lake Michigan. The site encompasses 1,275 acres, 200 of which are occupied by laboratory facilities. Founded in 1946 by the Atomic Energy Commission to support the initial production of plutonium for the Manhattan Project, ANL is a multi-disciplinary laboratory that performs work in basic and applied science. ANL initially included a facility in Idaho, called ANL-West, located on the Idaho National Laboratory (INL) site outside of Idaho Falls, Idaho. In 2005, the ANL-W facility was formally incorporated into the INL and the name of the ANL-W facility was changed to the Materials and Fuel Complex. At that time, it was no longer necessary to distinguish between ANL-W and ANL-E, and the name of ANL-E

was changed to simply ANL. This report contains references to ANL and ANL-E; however, the distinction is not significant and is used to maintain consistency with references to specific documents, processes, or other records.

Inspection Process Overview

EPA Inspection No. EPA-ANL-CCP-RH-9.06-8 occurred on-site at ANL on September 12-14, 2006. The inspection was conducted in the following steps:

- (1) Obtaining and reviewing site procedures, reports, and other technical information related to RH WC activities at ANL-CCP in advance of the inspection
- (2) Preparing draft checklists and technical questions specific to WC areas prior to the inspection, as appropriate
- (3) Participating in a conference call with CBFO technical support contractors to brief the EPA inspection team members regarding technical details related to the ANL-CCP RH WC program
- (4) Interacting with CBFO and ANL-CCP personnel to arrange inspection logistics
- (5) One visit onsite at ANL to review personnel qualifications and training, and verify the technical adequacy or qualifications of RH WC personnel, procedures, processes, and equipment by means of interviews, observation, and demonstrations, and recording the results
- (6) Recording all concerns on EPA issue-tracking forms, which were completed and provided to CBFO and site personnel as they were generated (see Attachment B)
- (7) Communicating all pertinent information with CBFO and ANL-CCP personnel on site and in other meetings, as appropriate
- (8) Pursuing resolution of all identified issues prior to completion of the inspection and post-inspection by discussions with CBFO and ANL-CCP personnel
- (9) Conducting entrance, exit, and daily briefings for CBFO and ANL-CCP management personnel at ANL and CBFO, as appropriate
- (10) Preparation of this inspection report

8.0 TECHNICAL WASTE CHARACTERIZATION AREAS

8.1 Acceptable Knowledge

EPA examined the AK process and associated information to determine whether ANL-CCP demonstrated compliance with 40 CFR 194.8 requirements for RH waste stream: Argonne National Laboratory Waste Stream No. AERHDM.

Waste Characterization Element Description

As part of the inspection, EPA reviewed the following with respect to the use of AK for RH waste characterization at ANL:

- Waste stream identification and the definition of waste stream, including radiological content of the waste
- Identification of HLW, TRU vs. LLW, spent nuclear fuel
- Role of AK in the characterization methodology (including AK characterization using modeling/scaling factors derived by ANL)
- Compiling AK documentation and assembly of required information
- Adequacy of WCPIP AK process implementation and the AK Summary Report
- AK data traceability
- AK source document sufficiency
- WCPIP interpretation with respect to AK qualification
- Confirmatory Test Plan preparation and plan adequacy
- Characterization Reconciliation Report preparation and plan adequacy
- Correlation and Surrogate Summary form and CH-RH correlation
- Personnel training and qualification
- Applicability of mass spectrometry information
- NCRs and AK discrepancy resolution
- AK accuracy
- Plans for load management
- Identification of the method for determining data quality objectives (DQOs)
- DQOs attained through AK Qualification

Documents, Waste Containers, and Batch Data Reports Provided

Many of the documents listed below are considered by ANL-CCP as common to both the ANL and INL RH waste streams recently inspected by EPA. Therefore, some of the references listed were provided to EPA during the earlier INL inspection and were not requested again during the ANL inspection. EPA verified that the appropriate revision of each document was provided.

- DOE/WIPP-02-3214, Remote Handled TRU Waste Characterization Program Implementation Plan, Revision 0D, October 30, 2003
- DOE/WIPP-02-3122, Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plan, Revision 5, effective date TBD
- CCP-PO-002, Revision 16, CCP Transuranic Waste Certification Plan, dated May 8, 2006
- CCP-AK-ANLE-500, Central Characterization Project Acceptable Knowledge Summary Report for Argonne Remote-Handled Debris Waste, Revision 1, July 18, 2006
- CCP-AK-ANLE-501, Central Characterization Project Remote-Handled Transuranic Radiological Characterization Technical Report for Remote-handled Transuranic Debris Waste from Argonne National Laboratory-East, Revision 0, July 21, 2006

- CCP-AK-INL-502 Central Characterization Project, RH TRU Waste Certification Plan for 40 CFR Part 194 Compliance and Confirmation Test Plan for ANL RH Waste Stream: AERHDM, Revision 0, July 21, 2006
- CCP-TP-506, CCP Preparation of the Remote-Handled Transuranic Waste Acceptable Knowledge Characterization Reconciliation Report, Revision 2, June 8, 2006
- Inter-Office Correspondence, from A.J. Fisher to I. Quintana, Acceptable Knowledge Accuracy Report: Argonne National Laboratory- East Waste Stream Number AERHDM, dated August 28, 2006
- P593, Engineering Design File, Quantifying Special Actinides in RH-TRU Waste from Irradiated Fuel Examined at ANL-E, EDF-2555 Revision 0, December 16, 2002
- P592, Evaluation of Radionuclide contents in RH-TRU Waste Drums 728 through 737 Based on Reported Irradiated Fuel Examination INEEL/EXT-02-00168, Revision 0, September 2003
- AK Tracking Spreadsheet for Argonne National Laboratory, print out dated September 13, 2006
- Characterization Reconciliation Report for Waste Stream CRR-ANLE-AERHDM, signed August 30, 2006
- NCR-RHANL-0002-06, Revision 0, NCR dealing with waste cans 292 (Drum 00825) and 257 and 260 (Waste Drums 00829), dated July 12, 2006
- AK Pu-FGE Factor Calculation, Including AK-derived Isotopics, for Drums 810 (Container 76642), 815 (76650), 817 (76652), 820 (78103), 824 (78107) and 826 (78109), provided during inspection (individual sheets dated March 7-8, 2002, and August 1999 (824))
- CCP-TP-500 Revision 2, Attachment 1 VE Data Forms for RH Drums 810, 815, 817, 820, 824, and 826 BDR RHANLVE060001, various dates, 2006
- Container Dose to Curie Conversion Records for Drums 810, 815, 817, 820, 824, and 826, provided during inspection September 2006 (dated analysis August 8-9, 2006)
- RH TRU Waste Correlation and Surrogate Summary Form, ANL RH TRU Waste Stream AERHDM, provided during audit September 13, 2006
- AK Qualification Card, Kevin Peters dated August 6, 2003; Resumes for K. Peters and S. Schafer provided September 13, 2006
- Source Documents Reference List (CCP-TP-005 Revision 17 Attachment 4) undated
- Solid Radioactive Waste Disposal Requisition Date sheets, various containers provided September 2006
- CCP-QP-002, CCP Training and Qualification Plan, Revision 20 Effective date 5/3/2006
- C003, Intra-laboratory Memo to Harvey Welsh re: Dimensions of Intermediate TRU Waste Containers, prepared by Dennis Donahue, dated September 14, 1989
- C006, Interview with Larry Neimark, re: AGHCF samples, applicable programs, defense relationship to materials and commingling of the waste; Cheryl Schultz Record of communication ROC-C6, July 17, 2001

- C024, Intra-laboratory memo to W.C. Kettman from L.A. Neimark IPR, Clarification of 00 No.29 with Regard to Inventory of 8-inch Storage Holes, dated December 7, 1993
- C058, Intra-laboratory memo to R. Boule from Ralph Ditch, re: Needs Prior to Shipment of Nelmarks's TRU-RH Drums to Idaho, dated March 1, 1990
- C060, Intra-laboratory memo to R. Boule from A.C. Smith, re: Status: Resumption of Shipments of TRU waste to INEL, dated March 30, 1990
- C066, Record of Communication between Bill Kettman and Dennis Donahue, re: AGHCF Operations and Waste Packaging, recorded by Julia Whitworth and M. Wyco, dated August 7, 2001
- C084, Intra-laboratory Memo to Building 212 Personnel re: Disposal of Solid Radioactive Waste, F.P. Marchetti, dated February 4, 1986
- C121, Record of Communication with L. Neimark, A. Cohen, and F. Pausche by J. Whitworth and J. Biedscheld, and P. Kuan, R. Bhatt, and S. Kheriche, re: ACHCF Radiological Characterization of RH-TRU Waste Shipped to INEEL, dated December 19, 2001
- C149, Correspondence to Mr. Daniel Hecker, Waste Management Office, Argonne National Laboratory-East re: Transmittal of Final Argonne National Laboratory-East Transuranic Waste Acceptable Knowledge Report; Tom Krause, Project Manager, Benchmark Environmental Corporation, a ThermoRetec Company, September 29, 2000
- C306, Memo from R.J. Page to G.L. Winner, Subject: Isotopic Inventory of the AGHCF, R.J. Page, July 20, 2005
- C330, Memorandum to Ines Tray, CBFO from F. Marcinowski, Determination and Findings, Defense Origin of Nuclear Waste, Kerr-McGee Waste, dated April 15, 2005
- C331, Memorandum to CCP Central Records from K. Peters, re: Evaluation of Kerr-McGee Production and FFTF History, dated June 26, 2004
- C332, Memorandum to CCP Central Records from D.B. Becker, re: Assessment of Waste Material Parameters for Waste Stream ID-ANLE-S5000, dated January 3, 2006
- C333, Memorandum to CCP Central Records from D.B. Becker, re: Assessment of Waste Material Parameters for Waste Stream AERHDM, dated January 2006
- C345, Shaw Discrepancy Report R8 for RH TRU Waste form ANL-E, AGHCF, re: WMC determination, Cheryl Schultz, July 15, 2003
- C349, Radiological Evaluation for Waste Stream AERHDM, S. Schafer, August 3, 2006
- DR10, Discrepancy Resolution Regarding the Volume of 7-Gallon Waste Cans, K. Peters, DR10 June 7, 2006
- DR011, Waste Requisition and Videotape Discrepancies, Lisa Price, undated (signed August 16, 2006)
- DR013, Discrepancy Resolution Form Regarding the Argonne Waste Population of 44 drums versus 45 drums, S. Schafer, August 28, 2006

- P001, AGHCF Operations Manual, Argonne National Laboratory, IPS-2-00-00, 2, dated September 10, 1990
- P002, Central Characterization Project Acceptable Knowledge Report for Argonne National Laboratory-East Contact Handled TRU Waste Facility Maintenance and Laboratory Operations; CCP-AK-ANLE-001, Revision 11, dated December 31, 2003
- P006, Safety Analysis for Twenty Year Retrievable Storage of Intermediate Gamma Level Transuranic Waste, W.D. Jackson Alpha-Gamma Hot Cell Facility, Argonne National Laboratory, dated June 1, 1976
- P009, TRU-RH Waste Certification Plan for Waste Management Operations, Ralph W. Ditch and Gary Griggin, J0306-0033-SA Revisions 2 and 4, dated November 10, 1986 and April 16, 1991
- P012, The Status of Uranium-Silicon Alloy Fuel Development for the RERTR Program, R.F. Domagia, C. Wiencek, H.R. Thresh and D. Stahl; Argonne National laboratory, Materials Science Division, November 1, 1990
- P013, Frontiers: Research Highlights 1946-1996, Argonne National Laboratory, January 1, 1996
- P023, Argonne National Laboratory-East Remote Handled Waste, by W. Mahlon Hellaeson, EDF-RWMC-759, August 29, 1994
- P032, Procedure for Sorting Remote-Handled TRU Waste (30-Gallon Intermediate-Level Waste), Alpha-Gamma-Hot Cell Facility Irradiation Performance Section Materials and Components Technology Division, dated January 7, 1987
- P055, [Argonne East] Waste Handling Procedures, C.L. Cheever, Manager Waste Management Operations, dated September 18, 1986
- P380, Alpha Gamma Hot Cell Facility (ACHCF) Safety Analysis Report, ANL-IPS-221-00-01, Revision 1, October 2001
- P412, Remote Handled Transuranic Waste Sorting and Packaging, ANL AGHCF-OPS-302, Revisions 0 and 2, July 9, 2001 and March 29, 2006
- P414, Estimation of Activity in Waste Containers, ANLE AGHCF-OPS-304, Revision 0, April 20, 2001
- P575, Work Plan for the Examination of Fuel Plates from the RERTR-4 Experiment in ATR, Revision 1, R.V. Strain IPS-400-01-00, February 22, 2002
- P587, Program Scoping Plan for the Fast Flux Test Facility, A Nuclear Science and Irradiation Services User Facility, PNNL-12245, Revision 1, August 1999
- P599, the Defense Programs Origin of Transuranic Waste at Argonne National Laboratory-West, H.F. McFarlane, ANLE-NT-192, November 2001
- P604, Criticality Hazards Control Statement, Alpha-Gamma Hot Cell Facility, Special Facility FF12, and Addendum 1, Use of a Safe Vac Vacuum Cleaner in Alpha-Gamma Hot Cell Facility Areas 1 and 3, James A. Morman, IPS-6-00-09; IPS-6-01-10; Revisions 9 and 10, March 1990 and July 2001

- P611, Waste Handling Procedures Manual-Appendix I, Radioactive Waste Management Basis, ANL, RWMB-01, Revision 1, April 6, 2004
- U001, AGHFC Position Statement Regarding Defense Versus Non Defense TRU Waste, no author cited, April 7, 2000
- U013, Waste Stream Fissile Content [AGHCF], March 23, 1990
- U015, RH-TRU 1995, Book 5 Drums 798 to 809, no author cited, January 1, 1995
- U027, Report of Analytical Results; CMT-84 (10-84), August 1, 1990
- U036, Acceptable Knowledge for ANL RH-TRU Waste, R.T. Klann, K.N. Grimm, and B.A. Brush, ANL-E-U036, undated
- U040, Spreadsheet Correlating Number Quota with Quota Title and Number Project, no author cited, July 31, 2002
- U041, Videotape Logs data [Cans 100, 102-187, 217-231, and 234-246], Cheryl L. Schulz (no title given), September 15, 2001
- U072, MSDS sheets, various components, no author cited, undated
- U076, AGHCF Fissile Inventory Management System Database; July 16, 2001
- U305, Isotopic Data Report from H.B. Robinson Report; undated and source not cited
- U332, WMO-105 Radioactive and Mixed Waste Disposal Requisitions, ANL, no specific dates or authors cited
- U334, Handwritten Drum list of Drums with top and bottom can numbers, Terry Bray, 1976–2002
- U335, Various Excel Spreadsheets Regarding Fissile Material and Waste Management Tracking, no specific dates or authors cited
- U336, Various Inventory Spreadsheets from AGHCF, no specific dates or authors cited
- U882, Pre-Irradiated Fuel Composition, ANLE, June 22, 2006
- U887, Uncertainty Analysis for Drums, June 22, 2006

Table 4. Listing of BDRs

Drum	VE BDR	DTC BDR
00810	RHANLE VE 06001	ANLE RH DTC C06001
00815	RHANLE VE 06001	ANLE RH DTC C06001
00817	RHANLE VE 06001	ANLE RH DTC C06001
00820	RHANLE VE 06001	ANLE RH DTC C06001
00824	RHANLE VE 06001	ANLE RH DTC C06001
00826	RHANLE VE 06001	ANLE RH DTC C06001

Waste Stream AERHDM consists of waste both generated prior to an approved QA program, i.e., retrievably-stored waste, as well as wastes that will be packaged and generated in the future and will be considered newly-generated waste. ANL-CCP proposed the use of confirmatory testing for the retrievably-stored component, while “qualification” of the AK via approved characterization methodologies will be used for the newly-generated component. The

retrievably-stored confirmatory testing and newly-generated AK qualification both assign TRU and activity-related DQOs using DTC and AK-based scaling factors derived through ORIGEN2.2 modeling (previously examined as part of the RH baseline inspection at the Idaho National Laboratory and found adequate by EPA). Input parameters to this modeling were not individual drum AK data; rather, the individual fuel pins that contributed radionuclides to various waste drum lots were individually used as input to the ORIGEN2.2 code.

The evaluation presented in this section assesses the AK process and related activities dealing with the determination of physical and radiological waste composition, up to but not including model parameter determination, waste data input, and determination of scaling factors. Evaluation of individual model input parameters with respect to the related source documents was undertaken during activities presented in Section 8.3 that also address DTC for radiological waste characterization .

EPA's evaluation focused on the processes and related objective evidence. Therefore, EPA's summation, presented below, includes observations regarding the completeness of the AK record and inclusion of data in that record. EPA believes that the record must be complete to ensure data and process traceability. Future examination of AK records may include personnel that are not as directly associated with the generation of the data as those who compiled the AK data examined during this inspection; therefore, the recommended changes described below are made with that future examination in mind.

Technical Evaluation

- (1) Waste Stream AERHDM was examined with respect to whether the stream is adequately defined.

The RH Waste Characterization Program Implementation Plan (WCPIP) defines waste stream as "waste material generated from a single process or activity, or as waste with similar physical, chemical, and radiological properties." Waste stream AERHDM is a debris waste stream that was generated in the ANL-E hot cell and includes wastes that are currently in drums, as well as waste awaiting packaging that still resides in the hot cell.

As indicated in the AK Summary CCP-AK-ANLE-500, the waste stream consists of about 45 drums of waste generated in the cells from February 1993 through February 2002. In addition to these drummed wastes, some waste material created during the same time period remains in the hot cell, and will be packaged in the future as newly-generated waste. Between 50-100 drums of additional newly-generated waste may be packaged. The physical characteristics of each drum are recorded on waste can inventory records; information recorded includes the individual drum contents on a volume percent (glass bottles, cotton rags) that were assigned to EPA waste material parameters (WMPs) and converted to weight percentages. This analysis, documented in Reference C333, showed that this waste stream consists of about 64% inorganics (ferrous/non ferrous metals) and 36% organics (cellulosics, plastics and rubber). Analysis showed the absence of organic matrix (e.g., organic sludges). ANL-CCP representatives were asked about waste-generating processes to be used for newly-generated waste, specifically for the purpose of determining whether the newly-generated component of the waste stream would be physically similar to the retrievably-stored component. ANL-CCP representatives indicated that the

AGHCF⁴ currently contained cellulose, plastics, and rubbers (CPR), as well as large pieces of equipment and other metals/inorganics that would require size reduction prior to packaging. ANL-CCP provided photographs of the AGHCF and another hot cell showing the contents of each, and these are included in Figures 1, 2 and 3, below. Waste-generating procedures were not available for the newly-generated component of the waste stream. ANL-CCP representatives indicated that the newly-generated component will consist predominantly of inorganic materials consistent with the retrievably-stored drums, but the newly-generated waste may contain more decommissioning and decontamination (D&D) materials. Based on this information and the process history associated with the stream, the waste stream has been appropriately assigned with respect to physical characteristics.

AK radiological data pertaining to content of waste drums is presented in several references. As indicated in the AK Summary, ANLE used an ORIGEN2.2-based methodology to assign drum-specific radiological content using methods similar to that employed by ANL-CCP, but conducted this analysis on a per-campaign rather than waste stream basis. As a result, the AK record (Reference C349) includes drum-specific radiological data assigned by ANLE, using a method similar to that employed by ANL-CCP. Reference C349 states the range of reported external dose rates for the 45 containers as 0.58 R/hr to 180 R/hr, with an average of greater than 17 R/hr. It is not clear if this value represents a value on contact with each container or at 1 meter, which seems more likely. The TRU alpha concentration is listed as greater than 1,900 nCi/g per container. This value is heavily weighted by a small number of containers that are listed with concentrations in excess of 10,000 nCi/g, but these containers also had identified quantities of ²⁴¹Am, ²³⁸Pu, ²⁴⁰Pu, ²⁴¹Pu, and ²⁴²Pu that were not assigned to the other containers. Three of the 45 containers have an AK-assigned TRU alpha concentration of less than 100 nCi/g, but these containers did not have assigned values for ²⁴¹Am, ²³⁸Pu, ²⁴⁰Pu, ²⁴¹Pu, and ²⁴²Pu, so their assigned TRU values are likely to be too low. Based on this information, every container is expected to be RH, and AK suggested that each also contains TRU material.

In addition to the above, EPA examined the isotopic composition of the stream based on AK data as summarized in References C359 and U332. Every container from the waste stream that was examined had an AK-assigned gram value for ²³⁹Pu and ²³⁵U, with the values assigned via use of scaling factors (see item 3) to the following radionuclides: ^{113m}Cd, ¹⁴⁴Ce, ¹⁵²Eu, ¹⁵⁴Eu, ¹⁵⁵Eu, ²⁴¹Fe, ⁵⁴Mn, ¹⁴⁷Pm, ¹⁰⁶Ru, ¹²⁵Sb, ¹⁵¹Sm, ¹²³Sn, ¹²⁶Sn, ⁹⁰Sr, ⁹⁹Tc, ¹²⁷Te, and ⁹³Zr. ANL-CCP Reference C359 reported the weight percent of ²³⁹Pu and ²³⁵U for each container, as well as other nuclides for which a calculated weight was provided. Data presented suggested that the per drum weight percent ²³⁹Pu varied from 24%-72%, with an average of approximately 48%. For ²³⁵U, the content varied from approximately 11% to 60%, with an average of approximately 50%. The remaining approximately 2% not accounted for by ²³⁵U and ²³⁹Pu is represented by the gamma emitters listed above, as well as by ²⁴¹Am, ²⁴²Am, ²⁴³Am, and other radionuclides reported for four of the 45 containers. This analysis shows that the per-drum ²³⁵U and ²³⁹Pu values are expected to vary, but should average approximately 50-50 on a weight percent basis. It should be noted that AK suggests that Drums 76642-78117 (AK-assigned drum numbers) appear to have approximately 40% Pu and 60% ²³⁵U, while Drums 81790-81799 contain approximately 60% ²³⁹Pu and 40% ²³⁵U, indicating that these drums may have somewhat different isotopic signatures [see item (3) for ANL-CCP's assessment of the validity of AK data].

⁴ AGHCF is the Alpha-Gamma Hot Cell Facility at ANL-E.



Figure 1. Interior of AGHCF Hot Cell Showing Waste Material Still In Cell



Figure 2. Exterior View of AGHCF Hot Cell

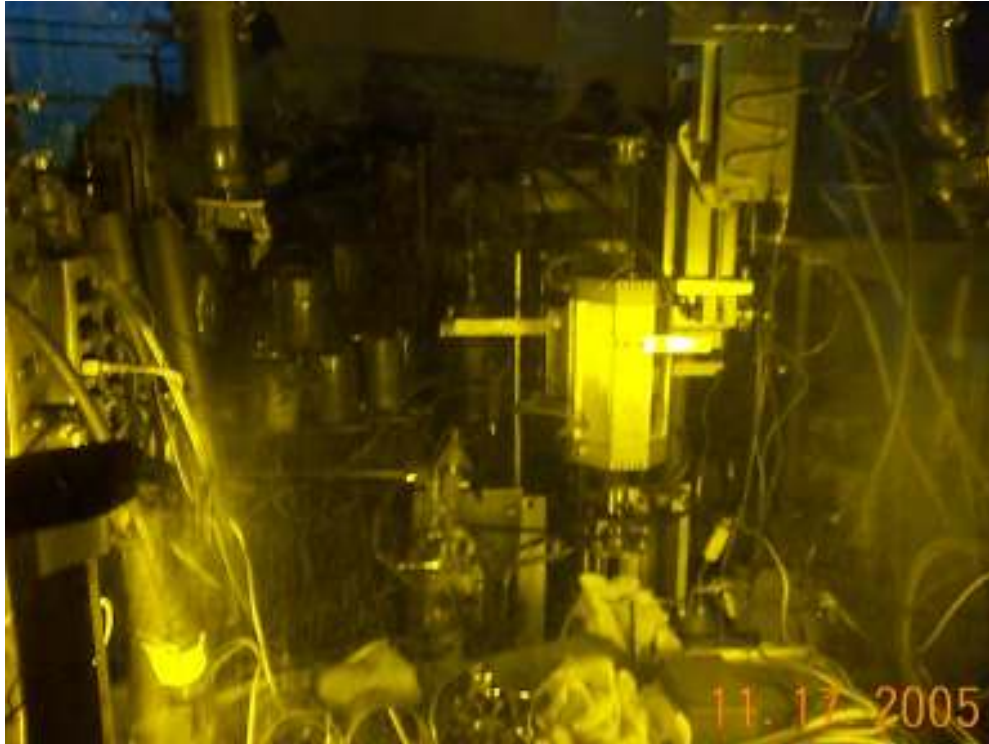


Figure 3. Interior View of a Hot Cell Showing Wastes Typical of AGHCF

EPA recognizes that the accuracy of these values has been questioned by ANL-CCP, and EPA believes this analysis generally indicates a comparable isotopic composition within the stream. On this basis, EPA concludes that the waste stream was appropriately defined based on the similarity of radiological components.

This examination was performed only for the purpose of verifying the waste stream assignment, and not for the purpose of assessing the adequacy or appropriateness of the per-drum radiological values. The above analysis applies only to the retrievably-stored portion of the waste stream. The material remaining in the hot cell that will be newly-generated cannot be assigned to any waste generating campaigns, and will be most accurately defined from a radiological perspective on a waste stream basis. The addition of any new waste streams not approved under this baseline is a T1 change. (See Table 1, where this is included as a T1 change.) Additionally, the modification of this waste stream to include additional containers beyond the 45 containers included in CCP-AK-ANLE-500, Revision 3 is a T1 change. (See Table 1, where this is included as a T1 change.)

(2) The identification of HLW, TRU vs. LLW, and Spent Nuclear Fuel was examined.

CCP-AK-INL-500 indicates that while samples of spent nuclear fuel were assessed to determine composition (References P344, P349 and P602), the actual spent nuclear fuel is separate from the RH debris waste generated through testing of this fuel, and is therefore not included in this waste stream. ANL-CCP representatives interviewed indicated that HLW is by definition not included in this waste stream. See item (16), below, for discussion of load management.

- (3) The drum-specific AK data were assessed, including ANLE AK-based characterization methodology presented in CCP-AK-ANLE-500 for the retrievably-stored portion of the waste stream.

ANL-CCP is required to obtain and evaluate as much drum-specific information as possible for RH waste. Drum-specific AK data for each of the retrievably-stored containers was identified by ANL-CCP, including both physical and radiological characterization information. The physical composition was assessed as part of item (1), above. The radiological AK data as it pertains to waste stream identification was also evaluated under item (1), above. Technical analysis with respect to how this AK data may be used is discussed herein.

CCP-AK-ANLE-500 presents a characterization activity performed by ANLE to assign radionuclide composition to each of the retrievably-stored waste containers in waste stream AERHDM. This method was formalized in 1996. Groups of cans were administratively combined into campaigns based on common waste generation dates. For each campaign, the AGHCF activities performed in the cell during the campaign period were determined from ANLE's Fissile Inventory Management System (FIMS), and the ^{235}U and ^{239}Pu contents of the materials tested in the hot cells during the time period were ascertained. ANLE assumed that when fuel segments were mounted, 50% was lost as swarf (shavings and chippings of metal), and 75% of the swarf was ultimately collected with the remaining 25% considered to have been in the form of dust and associated small particle size debris. Of this 25%, it was assumed that 7.5% was fixed on the cell's surface and not in the waste, while the remaining 17.5% was assumed to be in the RH waste. ANLE assigned Pu and ^{235}U values to each drum, and also assigned fission products using surface dose rates and applied scaling factors derived from the AGHCF Safety Analysis Report. ANL-CCP representatives indicated that these scaling factors were based in part on the maximum allowable amount of fission products within the cell, based on the facility's authorization basis. ANL-CCP representatives also indicated that derivation of the scaling factors was complex and difficult to follow based on the AK record. Data from this effort is presented in several references including C349 and U332. ANL-CCP representatives indicated that the method used by ANLE was incomplete, and did not include all of the materials managed in the hot cell during the specific campaign interval. Because the scaling factors were assigned based on the maximum allowable amount of fission products within the cell based on the facility's authorization basis, the AK data, while useful, was not accurate on a drum-specific basis. This determination was not documented in the AK summary, so ANL-CCP created a freeze file changed to CCP-AK-ANLE-500 as follows:

Replace the last paragraph of Section 5.4.2.1 with the following:

The stated purpose of the method employed by Argonne to estimate the radiological composition in individual waste containers was to address site accountability requirements and to comply with the maximum allowable fissile content of RH TRU drums. While the Argonne reported radiological content of containers in this waste stream was used to support the CCP waste stream delineation, RH, and TRU determinations, the Argonne methodology did not produce results adequate for the purposes of WIPP certification. For this reason, it is not appropriate to compare the Argonne estimates to the results of the CCP radiological characterization activities in AK accuracy evaluations. The approach employed by CCP to fully characterize this waste stream is described in Section 6.0 below, and the results of the CCP radiological

characterization are documented in CCP-AK-ANLE-501 (Reference 13, C350, P051, P414).

EPA compared the AK-derived values for ^{239}Pu , ^{235}U , ^{90}Sr , and ^{137}Cs with those that were derived by the dose-to-curie (DTC) method for Drum Nos. 810, 815, 817, 820, 824, and 826. This comparison showed that the AK-derived values for ^{239}Pu and ^{235}U were generally approximately one order of magnitude lower than those determined by DTC, while the AK-assigned values for ^{137}Cs and ^{90}Sr values were as much as two orders of magnitude lower. Differences in these values are expected because the ANLE values did not take into account all of the activities identified in the FIMS for the specified campaigns. The ANL-CCP process applies the same scaling factors to the whole waste stream, while the ANLE AK process considered waste on a campaign or container basis. ANL-CCP representatives stated during the inspection that ANLE's scaling factors would be "conservative," i.e., would result in higher than actual values, because the scaling is based on maximum allowed fission products in the cell, not measured values. If this is the case, the disparity between the true drum values and that obtained by DTC calculations may be greater than the AK-DTC comparison showed. Based on this analysis, use of the AK data as the absolute value of individual drum contents is not supported by the AK record, although comparison of the total waste stream contents as provided by AK with values derived through DTC would support the use of stream rather than drum-specific scaling factors. Performance of this analysis after full characterization of the approximately 45 drums in the stream would provide information directly relevant to the use of waste stream scaling factors in the future. In the proposed decision EPA specified that ANL-CCP perform a comparison of radionuclide values based on AK with radionuclide values derived by the application of the application of DTC/scaling factors and provide this comparison to EPA as a T2 change. EPA received a comment objecting to obtaining this information as a T2 change. (See Attachment C, CBFO Comment No. 9). Upon review, EPA concurs with the reasoning provided in the Comment. (See Attachment C for EPA response to Comment No. 9). Upon completion of the final DTC determination for each of the 45 drums in this waste stream, ANL-CCP must notify EPA that these determinations are complete through a T2 change notice. EPA may then request these results or other related data from ANL-CCP in order to compare how the data sets compare. Consistent with EPA's authority under 194.24(h) EPA may request new or additional information when it is necessary to ensure continued compliance with EPA regulations. Providing notification of the completion of the final DTC determination for each of these containers is a T2 change. (See Table 1, where this is included as a T2 change).

(4) Sufficiency of the AK Summary was evaluated, as well as implementation of AK as required in Attachment A of the WCPIP.

Attachment A of the WCPIP specifies that the following be included in AK Summaries: Executive Summary, Waste Stream Identification Summary, AK Data and Information description, Program Information, Waste Stream Information, Qualification of AK Information, and Container-Specific Information. Furthermore, Attachment A mandates a process that should be followed to collect and analyze AK data, similar to that used for CH waste. Both the content of the AK Summary and sufficiency of AK implementation were assessed.

CCP-AK-ANLE-500 represents ANLE waste generated in the AGHCF from 1993–2003; waste generated prior to this date was shipped to INL for storage and is described in CCP-AK-INL-500. Most of the references and technical content within the two AK documents

are the same, although the general types of reactor pins managed prior to 1993 (fast fuel) are different than the predominant types tested after 1993 (light water reactors). The reason that shipment to INL ceased is not presented in either document, and its inclusion would help to clarify whether this change represents a process break or changes in pin composition, or is based on other, non-technical reasons.

Chapter 6 of CCP-AK-ANLE-500 presents the general characterization methodology as it relates to AK and the qualification methods for each DQO. This information is satisfactory to the extent that the DQO methods are identified for general AK, but the section does not differentiate between AK generated prior to an approved quality assurance (QA) program and requiring 194.22-based QA qualification, and that obtained after program approval. While the overall methods may be the same for this waste stream, future streams may employ different methods for different elements of the waste stream and different AK confirmation requirements may apply.

The AK Summary does not address drum storage in sufficient detail to determine whether the containers could have become inundated, as was the case for RH wastes at INL (see Docket No: A-98-49, II-A4-69). During the inspection, ANL-CCP representatives provided data indicating that the drums were stored in surface vaults and that the likelihood of any secondary water infiltration is minimal. EPA expects every AK summary to address the storage and management of RH containers to ensure that secondary events that would impact the content or characteristics of the waste have not taken place. References were requested and examined with respect to the specific phrases in the AK Summary attributed to that reference. However, several documents listed as references in CCP-AK-ANLE-500 are not referenced in the text, and other references appear to have minimal relevance to AERHDM. EPA expects that ANL-CCP will continue to refine each AK summary, streamlining the document to ensure relevancy of information in the future. Additionally, Chapter 7 discusses tracking of ongoing characterization data using a tracking spreadsheet, but the intent of the WCPIP requirement to collect drum-specific AK data is to ensure that AK data are assembled and assessed. Examination of the AK Source Document Summary and other reference lists in CCP-AK-ANLE-500 and -501 show that these two documents do not completely reference relevant and appropriate support documentation (e.g., P801-P832, U801-U838, C801-C817). In short, the AK Summaries appear to reference documents not specifically relevant to Waste Stream AERHDM and to exclude references that are relevant and are documented in the Acceptable Knowledge Source Document Reference List. ANL-CCP is expected to continually refining these documents to ensure completeness. ANL-CCP should address the above potential changes to the AK summaries in forthcoming changes, and revisions to CCP-AK-ANLE-500 and CCP-AK-ANLE-501. CCP should notify EPA of these changes as a T2 change. Also, changes made to AK documentation as a result of revisions of the WCPIP EPA requires that ANL-CCP notify EPA through a T2 change notice when revisions to these documents have been made and are available. Consistent with EPA's authority under 194.24(h), EPA may request this information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.)

CCP-AK-ANLE-500 included the content mandated by the WCPIP, and the general process outlined in the WCPIP for AK data assembly was followed. ANL-CCP submitted a freeze file change to this AK Summary that documented ANL-CCP's analysis of drum-specific AK data,

and why those data are not acceptable for use in AK accuracy calculations [see Items (3) and (15)].

(5) Data traceability was examined.

As indicated in item (1) above, Reference U332 includes AK data for each drum in the waste stream, specifically WMO-195 Radioactive and Mixed Waste Disposal Requisitions that include detailed information regarding drum contents, including physical descriptions of drum contents in each 7-gallon container. Calculated isotopic compositions for each drum are also provided. When asked whether similar data would be generated for each newly-generated container, ANL-CCP representatives indicated that they had no information as to what the ANL personnel might generate based on site-specific requirements that are outside of the ANL-CCP program.

ANL-CCP representatives provided historic AK data for Drums 810, 815, 817, 820, 824, and 826, represented by AK container IDs 76642, 76650, 76652, 78103, 78107, and 78109, respectively. AK data provided included Plutonium Fissile Gram Equivalence (FGE) Calculation sheets, as well as selected WMO-195 Disposal Requisitions pages as presented in U332. Visual Examination Data Forms completed by ANL-CCP as part of their characterization program were provided for each drum, showing that examination of VE tapes for the selected drums had been completed. Waste Container Dose-to-Curie Conversion (DTC) Records for each container that documented the DTC calculations were also provided. Based on this information, traceability of container data from the AK record through current analysis is demonstrated. Scaling factors are assigned through the assembly, analysis, and modeling of fuel pin data, and traceability and technical viability of the data must be demonstrated. Examining the FIMS database, as documented in AK Reference U335, assessed traceability of the various PIN data to the AK record. ANL-CCP representatives performed additional data searches and identified more information that was not presented in the FIMS, or at least not in the portion of the FIMS that was originally examined. ANL-CCP indicated that a detailed data assembly process was followed to assess the information and obtain fuel pins relevant to the ANLE analysis, but this process is not formally documented. ANL-CCP summarized the process they used to assemble and assess fuel pin data as follows:

The first set of pins was identified by Terri Bray by a query she did from her FIMS database. Incidentally, a FIMS database query is where the INL population of pins came from as well. George Fenske (from ANL) worked on this list of pins and provided us with a spreadsheet (U841) of all the relevant information. We collected the documentation files and made them part of the AK record (P801-P832; U801-U838; C801-C817).

There were 2 different pin collection efforts going on simultaneously. INL was getting pin information on the INL population from Bud Fabian at Argonne, and we (CCP) were getting pin information on the ANL population from George Fenske. INL went through cutting and grinding logs and identified several additional pins of interest. INL documented those pins in an EDF (P614). We (CCP) went to Argonne and collected source documentation in order to identify composition, burnup, etc., for the pins that were identified for the INL population (U839).

We also took a trip to ANL to go through the sectioning slips (U840 and U826), which they began using in 1994, to ensure that all applicable ANL pins had been identified. We

identified several items of interest - we identified material type, etc., and sent the list to Jene. Jene went through the list and eliminated all but 9 of the pins, either because they were unirradiated or cladding, etc. These additional 9 pins plus the original list from George Fenske are all included in Jene's calc package (U882). Upon examination of these 9 pins, Jene determined that further data collection efforts were not needed because the necessary information was contained in the source documents that had already been collected (P801-P832; U801-U838; C801-C817).

It should be noted that ANL-CCP did not prepare an Engineering Design File (EDF) or an equivalent document that specifically identifies the additional data assembled or the assembly process. None of the EDFs cited above are included or referenced in CCP-AK-ANLE-500 or CCP-AK-ANLE-501, which document the review process, and accordingly these EDFs were not examined during the inspection. While these references are included on the AK Source Document Reference List, relevance of the references to the pin data assembly process could not be ascertained until ANL-CCP clarified the process post-inspection. Also, the source document reference list included several references not included in document-specific reference lists at the back of CCP-AK-ANLE-500 or CCP-AK-ANLE-501 (see item (4), above, for additional discussion). While the process described above appears logical, it must be fully described, include reference to the appropriate document(s), and be placed in the AK Record. The AK record must be complete and accurately document the processes for which approval is granted. Accordingly, the process by which fuel pin data were compiled and assessed that was provided to EPA post-inspection by e-mail should be formally documented in and submitted to the auditable record. EPA requires that ANL-CCP notify EPA through a T2 change notice when this information (listing of the references documenting the assembly of fuel pin data) has been completed and is available for EPA review. Consistent with EPA's authority under 194.24(h), EPA may request this information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.)

(6) Sufficiency of AK Support Documents and Related Document Tracking was evaluated.

An AK Source Document Reference List was prepared using unique identifiers for the different document types following the format used by ANL-CCP for CH wastes. The listing provided is based on CCP-TP-005 Revision 17, Attachment 4. The listing appears complete, and is easy to understand because it follows the same format that ANL-CCP uses for CH waste streams. It should be noted that EPA only examines support documentation specific to the technical element being referenced in the AK summary that caused that support reference to be selected for examination. EPA does not perform a full analysis of all data, but instead only checks the document to be sure that it addresses the technical issue for which it is referenced in the text of the AK summary.

(7) Interpretation of WCPIP, with respect to contents of the Certification Plan and Confirmatory Test Plan, was evaluated.

ANL-CCP provided a combined site-specific RH TRU Waste Certification Plan for 40 CFR 194 Compliance and Confirmatory Testing Plan (see item (8), below, for commentary on this Plan) that describes how DQOs will be met. In the case of ANL, and as stated in Chapter 6 of the AK summary, the ANL-CCP intends to use a combination of methods to qualify AK data. EPA interprets this to mean that ANL-CCP commits to collecting AK data for every RH waste stream,

and all AK for each DQO will be technically validated or verified by characterization methods presented in the WCPIP, primarily AK confirmation. While the reported methods, on the whole state, that AK is the basis for all DQOs that will be verified in various manners, it does not differentiate between the subsets of methods that will be used based upon the nature of the waste. For example, the newly-generated component of the waste will undergo actual VE while the physical attributes of the retrievably-stored portion of the stream will be assessed through VE tape review. In the future versions of this and other AK Summaries, EPA expects to see this differentiation.

Also note that the WCPIP states that if AK is insufficient, “additional information” will be collected using the same characterization methods as used to “qualify” AK, but this data, in turn, will not require qualification. It is unclear whether any of the information collected to meet DQOs as presented in Table 6 of CCP-AK-ANLE-500 is considered this additional information.

(8) Content and technical adequacy of the Confirmatory Test Plan was evaluated.

The WCPIP requires the following to be included in the Confirmatory Test Plan (CTP):

- A description of the waste stream or waste stream lots to which the plan applies
- A description of the confirmatory testing proposed, including the percentage of waste containers that will be subject to confirmatory testing
- An explicit description of the WC DQOs and QAOs that will be satisfied with the data being qualified
- A description of the DQOs and QAOs that will not be confirmed with the data being qualified and an explanation of how compliance with those DQOs and QAOs will be demonstrated
- A description of how the tested subpopulation will be representative of the waste stream or waste stream lot

The WCPIP requires submission of a CTP when confirmatory testing is to be performed outside of that described in the PIP. ANL-CCP indicates that the CTP was provided because the DTC method deviates from that presented in the WCPIP, but that the CTP will always be used to communicate the full characterization methodology that will be used for a given ANL-CCP waste stream. Furthermore, ANL-CCP will combine the EPA Certification Plan with the CTP, to ensure that EPA is fully informed of the characterization process intended for a given ANL-CCP waste stream. This approach is acceptable.

As indicated in Item (7), above, ANL-CCP provided a combined Confirmatory Test Plan (CTP) and Site Specific Certification Plan (CP) for AERHDM. The Plan appears to address many of the required elements that must be in a CTP, but the following statement is made with respect to the DQOs for TRU Waste Determination and Activity Determination:

The required site methodology for comparing radionuclide information from the confirmation with the AK record is performed in two parts. The work required to develop the isotopic abundances has been completed and is described in CCP-AK-ANLE-501

(Reference 3). It establishes that there are no significant discrepancies between the AK information used in the modeling and the qualification of that AK (modeling and sampling)...

It was not clear what ANL-CCP meant with regard to lack of discrepancies between AK information used in modeling and qualification of that data. Inclusion of the AK accuracy discussion under the Defense Determination DQO was found to be confusing, as it should be in a separate section. Also, sites are required to develop stream-specific AK accuracy evaluations with respect to radiological characteristics, and the discussion presented in the CCP-AK-ANLE-502 did not adequately address why ANLE AK drum-specific radiological data were not being used in AK accuracy determinations for TRU waste determinations and for Activity Determinations.

To address these concerns, ANL-CCP representatives prepared the following freeze file changes to CCP-AK-ANLE-502:

1. Move the AK accuracy report discussions from 4.1 to 4.0. The text begins with “An annual AK Accuracy Report...” and continues to the end of 4.1.
2. In the AK accuracy discussion, currently the 1st paragraph on page 12 beginning, “The radiological characterization...” Add as a new 2nd sentence “The process used to compile the AK information used as input data in the model (fuel characteristics and operating history), was evaluated by comparing this same type of information with mass spectrometry results on a specific set of fuel pins.”
3. Add as a new paragraph (between “These two evaluations....” and “Consequently...”
“Argonne had developed radiological information for containers in this waste stream primarily for the purposes of estimating the fissile content of individual waste containers to comply with accountability requirements and to comply with the maximum allowable fissile content of TH TRU drums. The Argonne methodology did not produce results adequate for the purposes of WIPP certification. For this reason, it is not appropriate to compare the Argonne estimates to the results of the ANL-CCP radiological characterization activities for purposes of AK accuracy evaluations.”
4. Same section, in the paragraph “DQO for TRU Waste Determination.” Add as new 3rd sentence, “The process used to compile the AK information used as input data in the model (fuel characteristics and operating history), was evaluated by comparing this same type of information with mass spectrometry results on a specific set of fuel pins.” In the current 4th sentence, revise to “...of the reported measurement results as documented in the QA Equivalency report (Reference 4) (nanocuries per gram).”
5. Same section, in the paragraph “DQO for Activity Determination.” Add as new 3rd sentence “The process used to compile the AK information used as input data in the model (fuel characteristics and operating history), was evaluated by comparing this same type of information with mass spectrometry results on a specific set of fuel pins.”
6. Same section, “DQO for Physical Form.”

EPA requires that ANL-CCP notify EPA through a T2 change notice upon completion of any revision to CCP-AK-ANLE-502 that reflects these changes. Consistent with EPA's authority under 194.24(h), EPA may request this information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.) Additionally, because CCP-AK-ANLE-500, CCP-AK-ANLE-501 and CCP-AK-ANLE-502 are integral to the ANL RH characterization process, substantive modifications to any of these documents that have the potential to affect the characterization process are T1 changes. (See Table 1, where this is included as a T1 change.)

The revised CTP also addresses DQOs, including a section on AK QAOs and application of AK accuracy. The adequacy of DTC with respect to addressing related DQOs is addressed in Section 8.2, as are the QAOs for that method. The DQO for RH waste determination is satisfactory. The QAOs associated with VE at the time of packaging have not been evaluated, because ANL-CCP has not yet implemented this process and EPA has not evaluated this method for RH waste at ANL.

The specific relevancy of the LANL mass spectrometry data to the ANLE pins and overall characterization process was discussed with ANL-CCP representatives, because CCP-AK-ANLE-502 states that there are "no significant discrepancies between the AK information used in the modeling and the qualification of that AK (modeling and sampling)." ANL-CCP representatives stated that the "AK information used in the modeling" is the ANLE fuel pin data assembled and evaluated by Mr. Jene Vance. ANL-CCP also indicated that "qualification of that AK" refers to the qualification of fuel pin data (ANLE included) through a demonstration that fuel pin data (LANL) used in ORIGEN2.2 can be validated using mass spectrometry data for those same fuel pins. ANL-CCP representatives clarified that the LANL mass spectrometry data are only relevant in that the overall use of ORIGEN2.2 and related codes using fuel pin data were validated by the comparison of the fuel pin data with mass spectrometry data for the same fuel pins. The ANLE fuel pins are not "the same" as LANL or INL fuel pins; ANLE is predominantly RERTR (a process that generated fuel pins) and light water reactor related, while INL/LANL fuel pins are predominantly breeder reactor (e.g., EBR-II) fuel pins. Therefore, the isotopic composition of the two is expected to be somewhat different, as evidenced by the development of different scaling factors for the ANLE and INL waste streams. While LANL mass spectrometry data helped show the need for (and ways to create) adjustment factors, the LANL data are not direct inputs to ANLE specific adjustment factors. ANL-CCP representatives indicated that the intent of the demonstration was to show that because the same process was used to assemble and assess ANLE and INL pin data, the overall process has been demonstrated to be satisfactory. This clarification was helpful, but CCP should provide documentation of the pin assembly and review process prior to calculating package development [see item (5), above]. EPA requires that ANL-CCP notify EPA through a T2 change notice upon completion of modifications to CCP-AK-ANLE-500 and/or CCP-AK-ANLE-502 as a result of the freeze file changes. Consistent with EPA's authority under 194.24(h), EPA may request this information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.)

(9) Content and technical adequacy of the Characterization Reconciliation Report was evaluated.

The content of CCP-TP-506, Revision 1, *CCP Preparation of the Remote-Handled Transuranic Waste Acceptable Knowledge Characterization Reconciliation Report*, was evaluated to

determine whether this document reflected the assembly of information required in the WCPIP. The content of the Characterization Reconciliation Report (CRR) was examined to see whether this report reflected requirements of CCP-TP-506, to ensure that the CRR addressed required elements. The CRR Report was evaluated to determine the completeness and adequacy of its contents as required in the WCPIP, including but not limited to:

- Specification of applicable site and waste stream
- A listing of each DQO
- Data from the AK record that addresses each DQO
- AK source document references that support/provide the data
- A listing of AK record discrepancy resolutions, if any, that are relevant to each DQO
- Documentation, including specific references, of how the AK data for each DQO were qualified, such as batch data reports, corroborative data, proceedings of a peer review, etc.
- Radiography and/or VE summary to document that liquids greater than 1 percent are absent from the waste and to confirm AK concerning the physical properties of the waste
- A summary presentation of radiological measurement data used to meet the DQOs and to confirm AK
- A complete AK summary
- A complete listing of all container identification numbers used to generate the WSPF, cross-referenced to each batch data report
- A listing of AK discrepancies generated by an AK qualification process and the corresponding resolutions
- Signature of the SPM

The example examined included all of the above requirements when examined as a whole. The CRR DQO worksheet (Attachment 3 of CCP-TP-506) should include the 10 WIPP-tracked radionuclides as part of the DQO assessment process, because this is a DQO as supported by EPA's CRA review. Site representatives recognized this, and indicated that the CRR will be revised when the revised WCPIP is in place. EPA's rule and CRA determinations have indicated that the 10 WIPP-tracked radionuclides presented in the CRA have specified quantities that serve as de facto repository limits. Therefore, these radionuclides should be included in the DQO analysis. EPA requires that ANL-CCP notify EPA through a T2 change notice upon completion of the revised CRR that includes the 10 WIPP-tracked radionuclides. Consistent with EPA's authority under 194.24(h), EPA may request this information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.)

(10) Use of a Correlation and Surrogate Summary Form was evaluated.

Completion of a Correlation and Surrogate Summary Form is required when AK information from a related CH waste stream is used in the RH WC process. ANL-CCP representative

indicated that CH data was not used in this manner. However, a Correlation and Surrogate Summary form was completed to support the correlation of LANL mass spectrometry data to ANL data for subsequent use in AK qualification. The form states:

Information and records retrieved from LANL were used not only in the radiological characterization of LANL's RH TRU waste, but also in the demonstration of the adequacy of the ANL-E input information and the overall modeling approach. A comparison between sampling data and ORIGEN 2.2 modeling at LANL demonstrated that the modeling approach used for ANL-E is a sound approach for determining scaling factors for use in characterizing the RH TRU debris waste stream...

The use of a correlation and surrogate summary for this purpose is satisfactory, noting that it should reference detailed reports, memos, or other data sources that support the issue. See item (5), above, for an evaluation of ANL-E input data traceability, data adequacy, and the overall modeling approach.

(11) Personnel training was evaluated.

Training records for Kevin Peters (AKE), Steve Schafer (AKE), Lisa Price (AKE), Larry Porter (SPM), Michael Walantine (SPQAO), and Jene Vance (SME/DTC) were evaluated during the INL inspection, with respect to: (1) training to the RH TRU WCPIP, (2) non conformance and corrective action processes, (3) the AK procedure presented in Attachment A of the WCPIP, (4) site-specific training relative to the contents of the subject waste stream(s) and (5) determination of radiological contents of individual drums. Each person demonstrated training in the first four areas.

With respect to determination of radiological contents of each drum, the resumes of Jene Vance, Kevin Peters, and Steve Schafer were examined. Jene Vance's expertise had been examined at INL (see Docket No: A-98-49, II-A4-69,) because he assembled and assessed INL and ANLE AK data that were used to derive scaling factors that were used in conjunction with DTC to determine radionuclide content. Although Mr. Vance did not show direct training with respect to this area, his resume showed sufficient expertise. Mr. Peters' and Mr. Shafer's resumes showed experience in the assembly and evaluation of AK data, including radiological information. It is expected that individuals associated with AK data assembly and interpretation, including SMEs, will have read all RH AK summaries and other summaries relevant to the waste stream being audited, and will have demonstrated experience or expertise in the assembly and interpretation of AK radiological, physical, and other data.

(12) The use of LANL mass spectrometry information was examined with respect to relevance to ANLE waste.

ANL-CCP has proposed the use of mass spectrometry data obtained from LANL to verify ORIGEN2.2 code results. The ANLE pins and resulting waste were contaminated from destructive examination of fuel pins from different reactors than the INL/LANL pins. Therefore, the mass spectrometry data are useful only in validating the use of ORIGEN2.2, and the mass spec data were not collected from pins common with the ANLE pins. ANL-CCP representatives indicated that they did not intend to demonstrate this relationship; instead, ANL-CCP intended to demonstrate the commonality of the type of data, data assembly/interpretation process, and

relevant calculations between INL and ANLE to show that the same process used to calculate INL scaling factors can be used for ANLE waste. Therefore, traceability of LANL mass spectrometry data to the specific pins used to determine ANLE scaling factors is apparently not required for this particular waste stream. See item (8), above, for additional analysis of fuel pin data, and item (5) for the ANLE Pin Data traceability analysis.

(13) NCRs and Discrepancy Resolution Forms were examined.

ANL-CCP personnel provided the following: NCR-RHANL-0002-06, Revision 0, NCR dealing with waste can nos. 292 (Drum 00825), 257, and 260 (Drum 00829), dated July 12, 2006; Discrepancy Resolution (DR) DR013, Discrepancy Resolution Form Regarding the Argonne Waste Population of 44 drums versus 45 drums, S. Schafer, August 28, 2006; DR11; and, DR10. DR11 concerns waste requisition and video discrepancies, while DR10 concerns a discrepancy regarding the volume of a 7-gallon waste can. Based on this information, it appears that ANL-CCP can adequately prepare NCRs and DRs to document nonconforming items or containers, as well as the types of discrepancies presented for review. EPA was not provided a specific example of an AK-AK discrepancy resolution involving radiological composition of waste, even though ANL-CCP representatives indicated that drum/lot AK data had been assessed and was not called upon to provide absolute or even qualitative data on a drum or lot basis. ANL-CCP did propose, however, to include this analysis as a “freeze file” change to CCP-AK-ANLE-500 [see item (3), above]. AK-AK discrepancies should be included in the AK record, particularly if AK data are found to be insufficient.

(14) A Waste Stream Profile Form was examined.

An example Waste Stream Profile Form was examined for Waste Stream Number ANL-AERHDM. The form included required line items as presented in the WCPIP, Attachment 4; the CRR and RH AK summary are also required for submission to CBFO to allow assessment of the waste stream profile form (WSPF). It is understood that this form is abbreviated because it was provided for audit purposes only, and it is expected that the completed form will include more AK data, checklists, etc., to better present the required information. See comments on the CRR and AK summary for additional information. EPA requires that ANL-CCP notify EPA through a T2 change notice upon completion of the actual, completed WSPF and all related attachments. Consistent with EPA’s authority under 194.24(h), EPA may request this information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.)

(15) AK accuracy was assessed.

The WCPIP requires AK accuracy be assessed in three areas: reassignment of the waste to a different Summary Category Group; reassignment of the waste to a different waste stream; and stream-specific assessment of radiological parameter accuracy. The AK Accuracy Report does not call for comparison of AK drum-specific radiological data as a measure of AK accuracy for TRU waste determination or radiological component/activity determination. ANL-CCP revised the AK Summary to justify this exclusion, as ANL-CCP believes that the per-drum radiological AK data calculated by ANLE is inadequate and therefore cannot be used for comparison purposes. See item (3), above, for EPA analysis of this conclusion. EPA initiated an EPA Inspection Issue Tracking Form for the concern discussed below (see Attachment B.4 for a copy of this form):

EPA Concern No. EPA-ANL-RH-CCP-AK-06-003C:

Section 4.1.1.2 of the WCPIP states the following: “The percentage of waste containers which require reassignment to a new SCG or new waste stream ... will be reported as a measure of AK Accuracy”. The AK Accuracy Report dated August 28, 2006, reports SCG accuracy, but not waste stream accuracy.

Resolution: This concern did not require an immediate response, noting that the AK accuracy document would be among those documents expected to require revising when the latest revision of the WCPIP is approved. EPA’s concern stated that revising the AK Accuracy Report to address the above requirements might be completed when other revisions are in process, e.g., addition of the 10 WIPP-tracked radionuclides as a DQO.

Status of Concern: EPA considers this concern closed. EPA requires that ANL-CCP notify EPA through a T2 change notice when the revised AK accuracy memorandum is complete and available for EPA review. EPA expects that the AK accuracy memoranda will be prepared annually, at a minimum. Consistent with EPA’s authority under 194.24(h), EPA may request this memorandum or related information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.)

(16) Load Management was assessed.

The possibility that containers may exhibit less than 100 nCi/g TRU was evaluated. AK data presented in U332 and summarized in C349 indicated that three of the 45 containers had AK-assigned TRU concentrations of less than 100 nCi/g based on ²³⁹Pu, noting that none of these containers had assigned ²⁴¹Am, ²³⁸Pu, ²⁴⁰Pu, ²⁴¹Pu and ²⁴²Pu values so the assigned value of 100nCi/g is likely to be too low. ANL-CCP representatives also indicated that based on the application of the scaling factors developed for this waste stream, a container with a measured 1-meter dose rate of 3.8 mR/hr results in a TRU Alpha Concentration of 101 nCi/g, and containers with measured dose rates below this would be considered non-TRU and would be segregated for shipment in a different waste stream. The EPA inspection team verified this calculation using the spreadsheet shown in Section 8.2 and the input 1-meter dose rate of 3.8 mR/hr.

The average reported contact dose rate in the AK record for each of the 45 containers is over 17 rem/hr, with a range of 0.58 to 180 R/hr. The CTP states, “In the rare event that a waste

container might be 200mRem/hr at its surface (and as such, RH waste), but less than 200 mRem/hr at the surface when three such containers are loaded into an RH-72B canister, the canister will still be considered RH waste as defined in the LWA.” EPA expects that every container emplaced in the RH 72B canister will exhibit a contact external exposure rate (dose rate) equal to or greater than 200 mRem/hr prior to loading. If a container measures less than this value, IANL-CCP will consider the container to be that of contact-handled waste and will remove it from the RH waste stream. The implementation of load management for RH waste by ANL-CCP is a T1 change. (See Table 1 where this is included as a T1 change.)

(17) AK Qualification Method identification for each DQO was assessed.

ANL-CCP representatives indicated that the “qualification” method for all DQOs except for RH waste determination will be met through application of characterization methods to check AK. ANL-CCP indicates that confirmatory testing will be used for each DQO, but also implies that establishment of an equivalent QA program may be used to qualify the mass spectrometry data that are required to check ORIGEN2.2 runs.

EPA differentiates between the processes of *characterization/confirmation* and *qualification*, the later being wholly a QA function and beyond the purview of this EPA inspection. EPA’s term *characterization* does not modify the process proposed by ANL-CCP, but is a distinct language difference in that EPA’s characterization program does not perform QA data qualification. Rather, EPA examines the collection process whereby characterization data used to verify the AK data for relevant DQOs are assembled. Regardless, EPA notes that ANL-CCP has committed to verifying AK for each DQO. Verification includes the technical evaluation of confirmation methodologies, the results of the peer review process, and corroborating data, noting that corroborating data is not an allowed methodology in the version of the WCPIP in place at the time of the ANLE inspection.

(18) Attainment of DQOs through AK verification was evaluated.

As a result of the analysis presented in items (1) through (17), above, EPA was able to assess how each DQO will be addressed. The following DQOs must be addressed as per the WCPIP:

- Defense determination
- TRU waste determination
- RH waste determination
- Activity determination (TRU Alpha Activity per canister, including quantification and identification of 10 EPA radionuclides)
- Residual liquids
- Physical form, including metals and CPR

All of these DQOs, except for RH waste and defense determination, are based on AK that is confirmed through various WCPIP-allowed techniques or variants on those techniques. RH status is determined through direct dose rate measurement. DOE is responsible for making a defense determination as discussed in the AK documentation, and cannot be qualified or otherwise verified through confirmatory sampling, etc. The use of AK to determine all DQOs, with accompanying confirmation or other verification of AK data that EPA evaluated during this inspection, is acceptable to EPA and comports with the fundamental intent of the WCPIP.

Summary of AK Findings and Concerns

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

Baseline Approval

EPA is approving the AK process evaluated during this baseline inspection. Specifically, the approval is limited to one ANL RH retrievably-stored debris waste stream, AERHMD, consistent with the limitations described in CCP-AK-ANLE-500, Revision 3.

AK Tiers

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

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

- Any new waste streams not approved under this baseline
- Modification of the approved waste stream AERHDM to include additional containers beyond the approximately 45 included in CCP-AK-ANLE-500, Revision 1. The 20 *additional* containers identified in the AK summary as being present are not included in this waste stream approval
- Substantive modification(s)*** that have the potential to affect the characterization process to CCP-AK-ANLE-500, CCP-AK-ANLE-501 or CCP-AK-ANLE-502
- Implementation of load management for any RH waste stream

T1 changes will be reported and documentation will be submitted when ANL-CCP is ready for EPA review. Upon initial review, EPA will inform ANL-CCP and CBFO whether a site inspection is necessary. EPA may request additional information, choose to conduct a desktop review, and/or confer with CBFO and ANL-CCP personnel. Upon AK evaluation with or without site inspection, EPA will issue a decision. Only upon receiving EPA written approval may ANL-CCP implement T1 changes.

T2 AK changes that do not require EPA approval prior to implementation but require a brief description of the changes to the documents along with the notification, include the following:

- Notification to EPA that the final DTC determination is complete for RH containers in the approved waste stream
- Notification to EPA when updates are made to AK documentation as a result of WCPIP revisions**
- Notification that updates have been completed to the following documents:

- All future revisions of CCP-ANLE-AK-500, CCP-ANLE-AK-501
- Listing of the references that document the assembly of fuel pin data and review process
- All future revisions of CCP-ANLE-AK-502
- CCP-AK-ANLE-500 and CCP-AK-ANLE-502 to address freeze file changes
- Notification to EPA that the data package for this debris waste stream is completed, including any modifications to the WSPF including the CRR and AK Summary
- Completion of AK accuracy reports, prepared annually at a minimum

Following EPA approval, ANL-CCP will provide EPA with information concerning T2 changes on a quarterly basis. When notifying EPA as a T2 change that additional information is available, the notification should provide a brief description of the type of additional information. EPA will then determine whether to seek the new, additional information from ANL-CCP. EPA will evaluate these changes and communicate with ANL-CCP as to whether the changes raise any concerns and require an ANL-CCP response, or whether ANL-CCP can continue to implement the changes. Consistent with EPA's authority under 194.24(h) EPA may request information relative to these changes if EPA deems the information is necessary to ensure continued compliance with EPA regulations.

8.2 Radiological Characterization

EPA inspected the method by which the required radiological constituents for each waste container were determined. The nature of RH TRU wastes presents considerable difficulty with respect to obtaining meaningful measurement data. Apart from the obvious ALARA considerations associated with external radiation fields in excess of 200 mrem/hr, RH TRU waste containers typically contain concentrations of ^{137}Cs that prevent a meaningful isotopic determination in the same manner as is done for CH TRU wastes. At this time, ANL-CCP has not proposed to assay RH containers for radiological contents. An alternative approach is the use of a scaling factor, which allows the correlation of an easily measurable gamma emitter such as ^{137}Cs with difficult-to-measure actinides and TRU radionuclides. This is the essence of ANL-CCP's approach to radiological characterization. This method is a complex process and the inspection focused primarily on the following two aspects:

- The application of the Dose-to-Curie (DTC) technique to determine a container's external gamma exposure rate⁵ (dose rate) by correlating the measured dose rate to an activity concentration for ^{137}Cs
- Using scaling factors to convert the derived ^{137}Cs activity to activity values for the other 9 of the 10 WIPP-tracked radionuclides, including the uncertainty for each

⁵ The external exposure rate is a numerical value expressed in units of rem per unit time (typically mrem/hr) that includes the contributions of all radiations, i.e., neutron, gamma, beta and alpha. The formal determination of a container's RH status is documented in mrem/hr, but for the DTC procedure only a photon (gamma) determination is performed and this is referred to informally as a *dose rate*. For consistency, the term *dose rate* is used throughout this report.

This section provides an overview of the ANL RH radiological characterization process and discusses EPA's evaluation of the adequacy of ANL-CCP's radiological characterization program. The checklist in Attachment A.2 identifies the objective evidence that was examined and used to complete the technical assessment for the DTC aspect. Evaluation of the scaling factors was not amenable to a checklist, and this aspect is discussed in the text directly.

8.2.1 Overview of ANL Radiological Characterization Program

The radiological characterization aspect of the ANL RH WC program that EPA evaluated focused on techniques to characterize containers from a single RH TRU waste stream, AERHDM. This waste stream consists of 45 30-gallon drums of debris waste (S5000) that were generated at ANL between February 1993 and February 2002. ANL-CCP estimates that an additional 50 to 100 drums will be generated during the packaging of existing wastes at the AGHCF. Based on the nature of the waste materials and the types and quantities of information available, ANL-CCP chose the approach of developing a WC protocol that, in their opinion, was best suited for characterizing the population of all RH TRU waste containers within ANL waste stream AERHDM. Specifically, a single scaling factor was assigned to fuel pin-related wastes generated from a variety of fuel types, an approach which is essentially the same as that used for RH TRU wastes by INL-CCP. The report for EPA Baseline Inspection No. EPA-INL-CCP-RH-6.06-8 (Docket No: A-98-49, II-A4-69) describes this approach in detail.

The actual measurement aspect, formalized in CCP procedures, consists of four simple external gamma readings of each waste container (the average value is used), all of which are attributed to a single photon-emitting radionuclide, ^{137}Cs . From a radiometric perspective, this is a simple task. The complexity of radiological characterization is contained in the development of the DTC approach that transforms each container's measured dose rate into a ^{137}Cs activity value which, in turn, is used in conjunction with scaling factors to produce concentrations for the remaining 9 of the 10 WIPP-tracked radionuclides and their corresponding uncertainties.

CCP generated the scaling factors using the Monte Carlo Neutron-Photon (MCNP5), ORIGEN2.2, and MicroShield computer codes, and compared them to isotopic distribution values based on mass spectrometry (MS) data that were generated at LANL. Beginning in the 1970s, destructive analyses were performed on 400 fuel pins at LANL to determine the relative abundances of plutonium and uranium isotopes along with isotopes of neodymium. Neodymium-148 is a fission product that is used to calculate burnup in fuel and is analogous to the fission product ^{137}Cs . ANL-CCP refers to this use of the MS data as *qualifying the ORIGEN2.2 results* with the LANL MS data, and the scaling factors were adjusted as a result of the comparison. In general, MS is an excellent analytical technique, and use of the MS data to adjust the isotopic scaling factors provided the opportunity to verify the results of the application of the ORIGEN2.2 codes. A technical assessment of the LANL MS data used to verify the ORIGEN2.2 codes was performed as part of EPA Baseline Inspection No. EPA-INL-CCP-RH-6.06-8 (Docket No. A-98-49, II-A4-69) at INL in June 2006. Based on this evaluation, EPA determined that the MS data were technically adequate to support ANL-CCP's use in verifying the ORIGEN2.2 results. Accordingly, the use of MS data to support the ANL RH WC program is not addressed in this report.

Figure 4 presents a flow chart of the ANL-CCP radiological characterization process given in CCP-AK-ANLE-501, Revision 0. The conceptual basis for the DTC approach and development of the scaling factors is documented in the 23 calculation packages that are listed in Table 10-1 of CCP-AK-ANLE-501, as well as the others listed below.

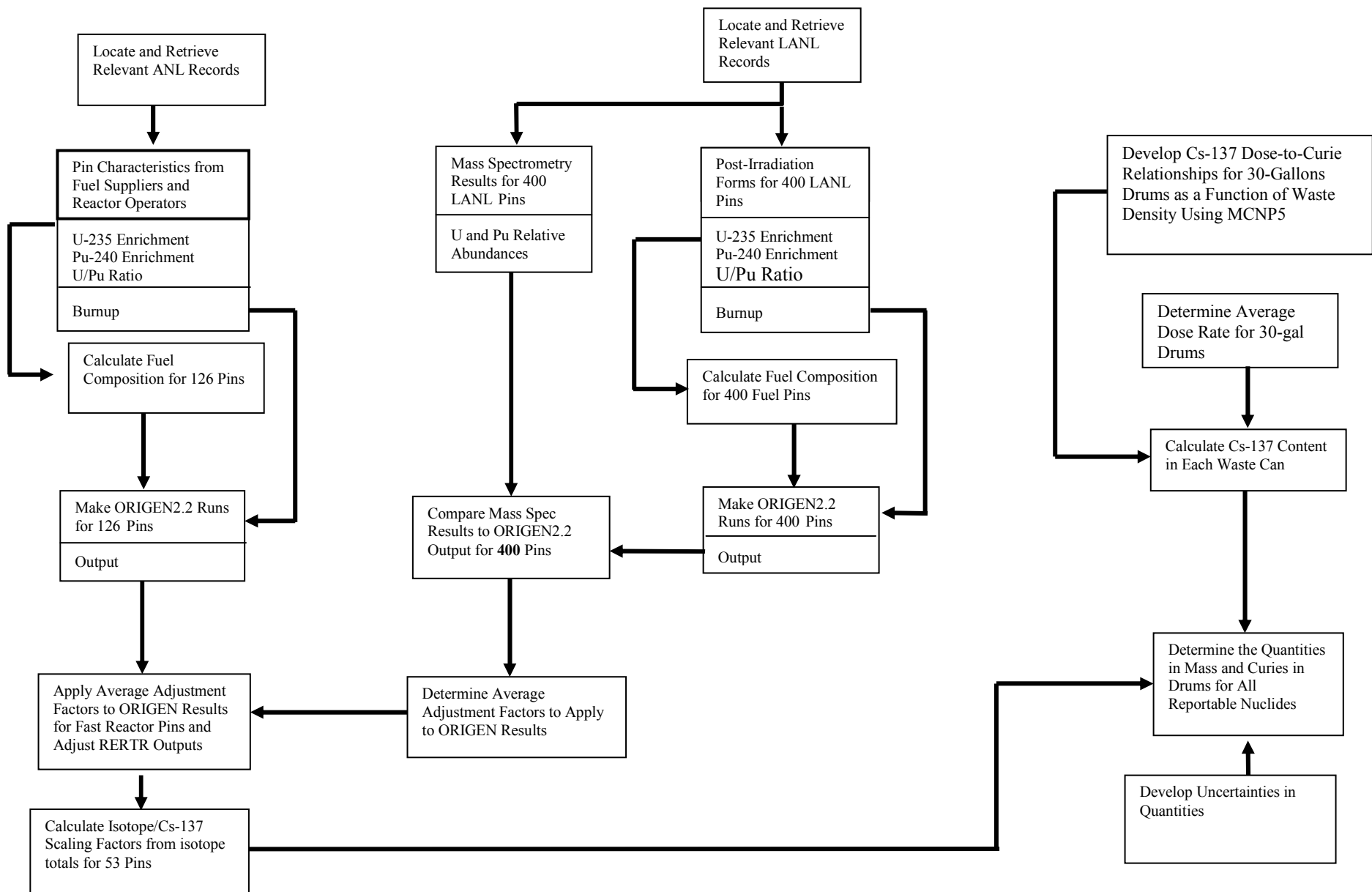


Figure 4. Overview of RH Characterization Process at ANL-E

Documents, Waste Containers, and Batch Data Reports Reviewed

The list of documents provided below includes all documents related to the ANL-CCP RH radiological characterization program that were evaluated to support this inspection:

- CPP-PO-002, CCP Transuranic Waste Certification Plan, Revision 17
- CCP-AK-ANLE-500, Central Characterization Project Acceptable Knowledge Summary Report for Argonne Remote-Handled Debris Waste, Revision 1, July 18, 2006
- CCP-AK-ANLE-501, Central Characterization Project Remote-Handled Transuranic Radiological Characterization Technical Report for Remote Handled Transuranic Debris Waste from Argonne National Laboratory-East, Revision 0, July 21, 2006
- CCP-AK-ANLE-502 Central Characterization Project, RH TRU Waste Certification Plan for 40 CFR Part 194 Compliance and Confirmation Test Plan for ANL RH Waste Stream: AERHDM, Revision 0, July 21, 2006
- CCP-TP-504, Dose-to-Curie Survey Procedure for Remote Handled Transuranic Waste, Revision 3
- CCP-TP-506, CCP Preparation of the Remote-Handled Transuranic Waste Acceptable Knowledge Characterization Reconciliation Report, Revision 2
- DTC BDR No. ANLRHDTC06001
- Calculation Package Supporting Scaling Factor Derivation: ANLE-RH-01, Fuel Information Input Check, Revision 1
- Calculation Package Supporting Scaling Factor Derivation: INL-RH-02, Scaling Factor Development
- Calculation Package Supporting Scaling Factor Derivation: INL-RH-03, Dose-to-Curie Derivations for Cs-137 in 30-gallon Drums
- Calculation Package Supporting Scaling Factor Derivation: ANLE-RH-03, Modification of ORIGEN2.2 INPUT files for Specific Fuel Pins
- Calculation Package Supporting Scaling Factor Derivation: ANLE-RH-04, Scaling Factor Development
- Calculation Package Supporting Scaling Factor Derivation: ANLE-RH-05, Dose-to-Curie and Related Calculations for Drum Characterization, Revision 1
- Calculation Package Supporting Scaling Factor Derivation: ANLE-RH-06, Uncertainty Analysis for Drums
- Calculation Package Supporting Scaling Factor Derivation: INL-RH-06, DTC Spreadsheet for Drum Characterization
- Calculation Package Supporting Scaling Factor Derivation: ANLE-RH-07, Determination of Isotopes To Be Reported per WIPP WAC

- Calculation Package Supporting Scaling Factor Derivation: LANL-RH-08, MicroShield 7.00 Verification

8.2.2 Radiological Characterization Element: Dose-To-Curie (DTC) Procedure

DTC Overview

ANL-CCP's approach was based on translating the measurable external gamma radiation from ^{137}Cs into an activity value using the MCNP5 code, as documented in INL-RH-03. All of the gamma radiation measured from each drum of RH waste was attributed to ^{137}Cs , as discussed in LANL-RH-10, INL-RH-09, and INL-RH-08. This includes contributions from ^{60}Co and other gamma-emitting members of the ^{232}U decay series, e.g., ^{228}Ac and ^{208}Tl . Once the container's *measured* gamma dose rate was converted into a ^{137}Cs activity, activities for the other nine WIPP-tracked radionuclides were scaled to the ^{137}Cs activity using a single set of scaling factors that were applied to all waste containers within the waste stream AERHDM. An example calculation using the observed dose rate in the DTC procedure is presented in Section 8.2.3, along with a discussion of the development of radionuclide scaling factors.

ANL-CCP formalized the ^{137}Cs measurement in the DTC procedure, CCP-TP-504, *Dose-to-Curie Survey Procedure for Remote Handled Transuranic Waste*, Revision 3. This procedure was evaluated prior to and during the inspection. The DTC process was evaluated relative to the following:

- Capability of the DTC hardware to adequately determine a container's external gamma exposure (dose) rate
- Technical adequacy of the radiological characterization program's documents, procedures, and controls
- Knowledge and understanding of the personnel involved in the radiological characterization program

The external dose rate determination was done empirically using measurements that took place at ANL outside in the Area 398 Yard. This area was configured specifically for the purpose of performing the DTC measurements and it is shown schematically in Figure 5. The EPA inspection team did observe the DTC procedure, but had to do this from a considerable distance due to the area's safety requirements. The measurement assembly was inspected in detail prior to the measurements, but all non-essential personnel had to evacuate before the top of the RH cask was opened. ANL-CCP personnel did provide photographs of the process. The conceptual basis for the DTC approach is explained in CCP-AK-INL-501, Revision 1, and is formalized in procedure form in CCP-TP-504, Revision 3, both of which were reviewed for this inspection. The requirements of these two documents were used to formulate a basis by which the EPA inspection team evaluated the DTC process. Additionally, several of the calculation packages listed in Section 8.2.1 supported technical aspects of the DTC approach.

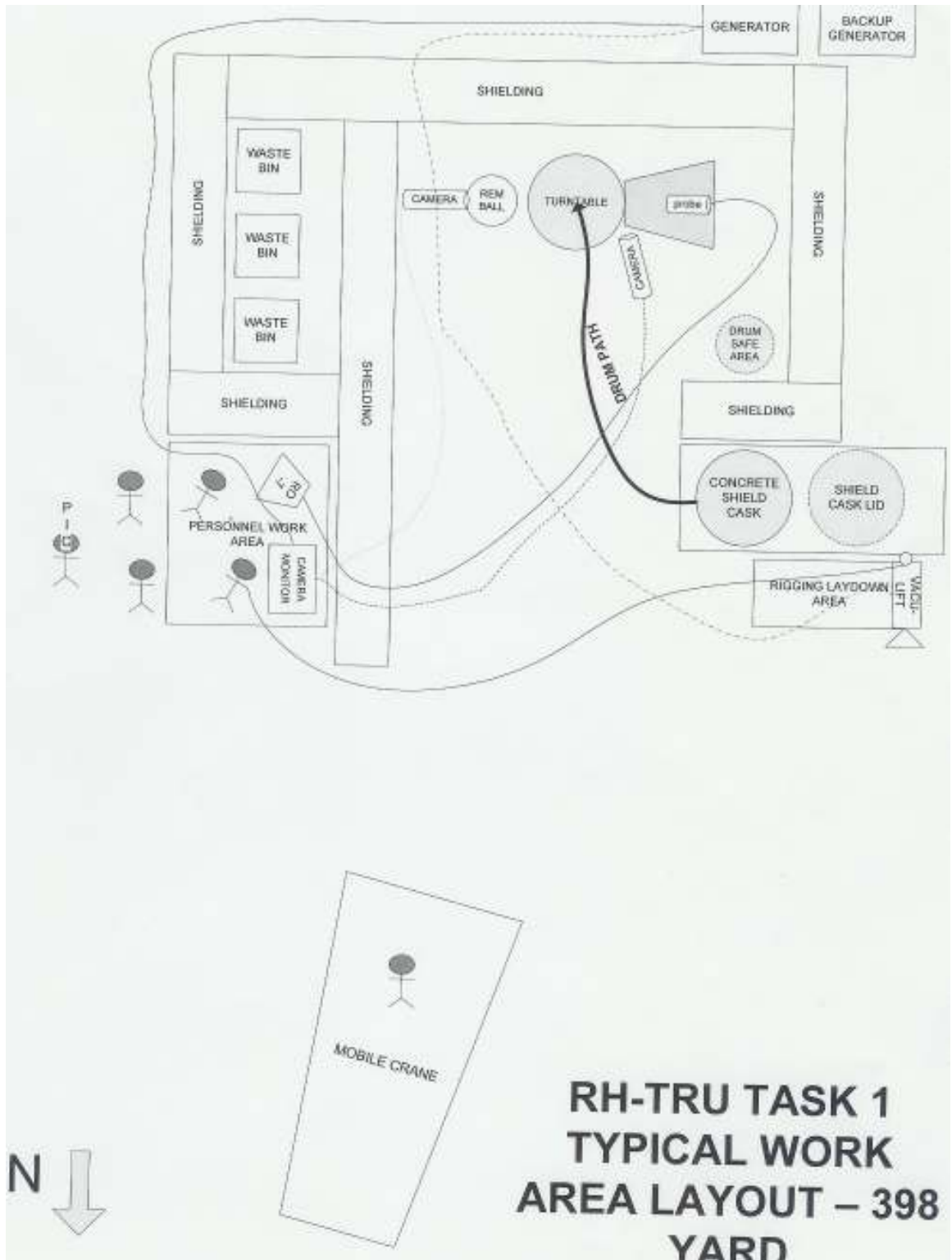


Figure 5. ANL DTC Measurement Facility

DTC Technical Evaluation

The EPA inspection team evaluated the following aspects:

(1) Instrumentation for making dose rate measurements

The EPA inspection team verified the following:

- There are two RO-7 Ion Chambers, SN 002003 and 002008. Each instrument had three different probes: RO-7LD with a full-scale range of 1,999 mR/hr and a resolution of 1 mR/hr (Low Range); RO-7BM, with a full-scale range of 199,900 mR/hr and a resolution of 100 mR/hr (Medium Range); and RO-7BH with a full-scale range of 199,900,000 mR/hr and a resolution of 10,000 mR/hr (High Range). Calibrations of the ion chambers and probes are independent, allowing any probe and ion chamber combination as long as each was calibrated.
- Both RO-7 Ion Chambers and all six probes had current calibrations as follows: RO-7 SN 002003, LD SN 727004, BM SN 726921, and BH SN 726656 were calibrated on February 28, 2006; and RO-7 SN 002008, LD SN 727010, BM SN 726938, and BH SN 726657 were calibrated on May 24, 2006.
- Both instruments had 60-ft cables that were used to measure the dose rate of containers for the DTC method, and there was a spare 60-ft cable (SN 302582) in the equipment trailer on-site. The cable length is important since the probes provide an analog signal to the ion chamber, which in turn functions as an analog-to-digital converter (ADC).
- It was verified that the scale used to weigh the containers has been calibrated and that the scale has been checked daily.
- The battery and performance checks for the RO-7 used to measure the dose rate of containers for the DTC method had been performed and documented at least once per day prior to the first measurement of the shift.
- The background rate of 1 mR/hr was measured and recorded. Measurement personnel stated that they would take actions to reduce the background if the measured background radiation levels are greater than one-tenth of the expected container dose or exposure rate, as required by the WCPIP and CCP-TP-504, Revision 2.

(2) Execution of the dose rate measurements at ANL on September 14, 2006

The EPA inspection team verified the following:

- For the waste containers observed (Drum No. 00829), the dose rate was measured four times, each at a distance of 1 meter and the container was rotated on the turntable 90° between each measurement, yielding readings of 160 mR/hr, 270 mR/hr, 250 mR/hr, and 185 mR/hr.

- The ANL-CCP personnel were working to the approved document, CCP-TP-504, Revision 2, and all measurements were taken at the center line of the drum's height and were lined up to the center height of the active volume of the ion chamber probe.
- The appropriate range probe for the ion chamber was used, i.e., Low Dose Probe SN 727010 with Ion Chamber SN 002008.
- The container number and measurement data were entered into the "Waste Container Dose-to-Curie Conversion Record" spreadsheet. Information entered included:
 - Date of the gamma measurements with the RO-7 Ion Chamber and Probe SN – September 14, 2006, Ion Chamber SN 002008 and Low Dose Probe SN 727010
 - Container number – 00829
 - Expected dose rate – 800 mR/hr
 - Container gross weight – 60.8 kg
 - Four quadrant dose rate measurements – 160, 270, 250 and 185 mR/hr
 - Background dose rate – 1 mR/hr

(3) DTC BDR

The EPA inspection team verified DTC BDR No. ANLRHDTC06001 included the following:

- SPM checklist, Attachment 8
- BDR cover sheet, Attachment 4
- DR table of contents, Attachment 5
- BDR narrative summary, Attachment 6
- ITR review checklist, Attachment 7
- Measurement control report, Attachment 1
- Container data sheets for seven containers, Attachment 2
- Waste container DTC conversion records for seven containers, Attachment 3
- Evidence of signatures by the ITR on Attachment 7 and a SPM on Attachment 8
- Type of waste in each container on Attachment 3, all organic
- Fill height of each container on Attachment 3, all 90% full
- Estimated Can Size for each container on Attachment 3, all 7-gallon containers

(4) Meeting quality assurance objectives (QAOs)

The EPA inspection team verified that:

- Precision had been established and maintained within the manufacturer's specifications for the RO-7 Ion Chamber by successful source checks made prior to obtaining dose rate measurements on actual waste containers.
- Accuracy had been established and maintained by operating the instrument within the manufacturer's recommendations.
- Representativeness had been maintained by applying the dose rate measurement to the entire waste container.

- Completeness had been achieved by measuring the dose rate for every container in the BDR, i.e., one hundred percent assay.
- Comparability had been achieved by using standardized instructions to design and implement the DTC protocol, including the dose rate measurements.

(5) RH TRU Determination

It was not entirely clear at what point the formal determination regarding a waste container's status would be made relative to the criteria for RH TRU. The EPA inspection team evaluated the two following aspects:

- RH TRU containers must have a contact external dose equivalent rate in excess of 200 mrem/hr: The DTC measurements that were observed and are discussed in this section represent only the photon (gamma) contribution to a container's external radiation field. There was a neutron-sensitive instrument (Rem Ball) in the same area as the RO-7 that could be used to provide the necessary information to support a complete determination regarding a waste container's status relative to the 200 mrem/hr criterion. ANL-CCP personnel stated that the Rem Ball was used to measure each waste container, but the results were used primarily for health physics/ALARA purposes. However, the RH determination based on the external dose rate is typically made on the basis of the transportation package and is therefore not within the purview of this inspection.
- RH TRU containers must have a concentration of TRU radionuclides greater than 100 nCi/g: CCP-TP-504 requires the container's dose rate to be at least a factor of ten greater than background, and the lowest reading possible on the RO-7 with the low dose probe is 1 mR/hr. This means that the minimum dose rate that can be measured at 1 meter is 10 mR/hr. Additionally, based on the factor of 20 difference between the contact and 1 meter readings⁶, a container would have to read at least 10 mR/hr at 1 meter to qualify as RH, i.e., have a contact reading greater than 200 mR/hr. The EPA inspection team wanted to verify that it was possible to ensure that a container at a boundary condition, i.e., with a 1-meter dose rate of 10 mR/hr, did in fact contain greater than 100 nCi/g of TRU radionuclides. As a check, the spreadsheet shown in Figure 6 was used with input values for a hypothetical 1-meter dose rate of 10 mR/hr. For this case, the spreadsheet yields a TRU Alpha Concentration of approximately 184 nCi/g, which meets the greater-than-100 nCi/g criterion for TRU waste. For comparison, the data for ANL Waste Container No. 00820 that has an average 1-meter dose rate of 230.25 mR/hr are shown in Figure 7. Its calculated TRU Alpha Concentration of 8,660 nCi/g is discussed in greater detail in Section 8.2.3 (see Table 9).

The EPA inspection team did not have any technical concerns or issues with the execution of the DTC methodology observed at ANL-CCP during this inspection, or with the method's technical basis and documentation based on the objective evidence that was reviewed.

⁶ The strength of the gamma intensity decreases as the square of the distance such that when the distance increases by a factor of two the gamma intensity decreases by a factor of four, i.e., two squared. This means that the container's contact dose reading is approximately 20 times greater than the reading at a distance of one-meter.

A	B	C	D	E	F	G	H
Operating Procedure			CCP-TP-504	Rev. 2			8
Date of Survey			6/1/2006				9
Waste Stream Designation			AERHDM				10
Container Number							11
Container Gross Weight			70	Kg			12
Waste Cans		Can #1	Can #2	Can #3			13
Can Sizes		7	7	0	gallons		14
Estimate Fill Percentages		100	100	78.5	%		15
Container Net Weight			46.5	Kg			16
Measured Container Dose Rate							17
Quadrant #1			10	mR/hr			18
Quadrant #2			10	mR/hr			19
Quadrant #3			10	mR/hr			20
Quadrant #4			10	mR/hr			21
Calculated Average Dose Rate			10	mR/hr			22
Waste Material Type			Organic		(organic, steel, cement)		

Figure 6. EXCEL™ (Version 2002, Release 10), DTC Spreadsheet Version 1.0 051006, Using Boundary Condition of a 1-Meter Reading of 10 mR/hr

A	B	C	D	E	F	G	H
Operating Procedure			CCP-TP-504	Rev. 3			8
Date of Survey			8/9/2006				9
Waste Stream Designation			AERHDM				10
Container Number			00820				11
Container Gross Weight			41.6	kg			12
Waste Cans		Can #1	Can #2	Can #3			13
Can Sizes		7	7		gallons		14
Estimate Fill Percentages		90	90		%		15
Container Net Weight			18.1	Kg			16
Measured Container Dose Rate							17
Quadrant #1			214	mR/hr			18
Quadrant #2			238	mR/hr			19
Quadrant #3			252	mR/hr			20
Quadrant #4			217	mR/hr			21
Calculated Average Dose Rate			230.25	mR/hr			22
Waste Material Type			Organic				

Figure 7. EXCEL™ (Version 2002, Release 10), DTC Spreadsheet Version 2.0 080406, Using Actual Data from Container No. 00820, Waste Stream AERHDM, Assayed August 10, 2006

EPA requires that ANL-CCP notify EPA through a T2 change notice upon completion of modifications to CCP-TP-504 that require CBFO approval. Consistent with EPA’s authority under 194.24(h), EPA may request this information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.) Additionally, the use of any alternate radiological other than the DTC technique as documented in CCP-TP-504 observed during this baseline inspection is a T1 change. (See Table 1, which includes this as a T1 change.)

8.2.3 Radiological Characterization Element: Scaling Factor Development

Scaling Factor Overview

As shown in the nine calculation packages listed in Section 8.2.1, this was a complex task that incorporated information from ANL-E, ANL-W, INL, and LANL, including the following:

- Fuel pin type and characteristics from fuel suppliers and reactor operators
- ²³⁵U enrichment
- ²⁴⁰Pu enrichment (for mixed oxide fuels) and burnup
- Uranium/plutonium ratios (for mixed oxide fuels)
- Examination of 603 fuel pins at ANL
- Mass spectrometry results for destructive assay (DA) of 400 fuel pins
- Other records related to AGHCF activities, names of experimenters, etc.

The scaling factors were incorporated in a drum characterization spreadsheet that required the following input:

- Drum gross weight in kilograms (kg)
- Identification of the can sizes (5-, 7- or 10-gallon) and number of cans in the drum
- Estimates of the can fill heights in percent
- Dose rate measurements at four quadrant points in mR/hr

The drum’s gross weight is calculated as:

$$\text{Gross drum weight} - (\text{drum weight} + \text{packaging materials} + \text{can weights}) \quad (1)$$

The weight values used for the various drum items are listed in Table 5.

Table 5. Weights of Items Used to Calculate Waste Weight and Density

Waste Items	Weight, kg
30-gallon drum	16.36
Polyethylene liner	3.61
Plastic pouch	1.73
Cardboard sleeve	1.41
Plastic lid	0.39
Total minus cans	23.5
7-gallon drum	2.84

5-gallon drum	2.26
10-gallon drum	3.42

The container's apparent weight density in g/cm^3 is calculated as:

$$\text{Net Waste Weight} / (\text{can \#1 \%H}_{\text{fill}} + \text{can \#2 \%H}_{\text{fill}} + \text{can \#3 \%H}_{\text{fill}}) \quad (2)$$

Where the net waste weight is in units of grams and can fill volume is given by:

$$C_{\text{size}} * \%H_{\text{fill}} * 3785 \text{ cm}^3/\text{gal} \quad (3)$$

Where:

C_{size} = can size in gallons

$\%H_{\text{fill}}$ = estimated fill height of each can in percent, expressed as a decimal

The inputs for the spreadsheet are shown in Figures 6 and 7 above for the hypothetical measured 1-meter dose rate of 10mR/hr and the actual measured dose rate of 230.25 mR/hr from Container No. 00820. Each uses a drum configuration of two 7-gallon cans each 90% full, net weights as shown, an organic matrix, and an apparent weight density. In both cases, the drum's ^{137}Cs content is derived as follows:

$$^{137}\text{Cs Activity in Ci} = \text{dose rate} / (11.91 * X^2 - 82.126 * X + 194.64) \quad (4)$$

Where:

X = apparent waste density, g/cm^3

The scaling factors for Container No. 00820 and the hypothetical example using the 10 mR/hr input discussed above are the same. All containers in this waste stream use the same scaling factors and the sample-specific variables are the container's measured dose rate and density. At a hypothetical value of zero density ($X = 0$), equation (4) becomes essentially a bare-source calculation; at higher densities, the effects of the waste's self-shielding are evident. Equation (4) is taken from INL-RH-03 and is based on a total of eight (8) MCNP cases that were generated using a waste material density varying from 0.0 g/cm^3 to 1.4 g/cm^3 in intervals of 0.2 g/cm^3 , a range that spans the expected range of waste densities in ANL drums. The results of the eight runs are presented in Table 6, below, and were used to generate a second-order polynomial curve to fit the data, shown in Figure 8. The constants and other values required for these calculations, i.e., Fissile Gram Equivalent (FGE) and Plutonium Equivalent Curies (PE Ci), were taken from the appropriate sources (CH WAC and TRAMPAC) and were checked for accuracy. These were found to be accurate and they are summarized in Table 7.

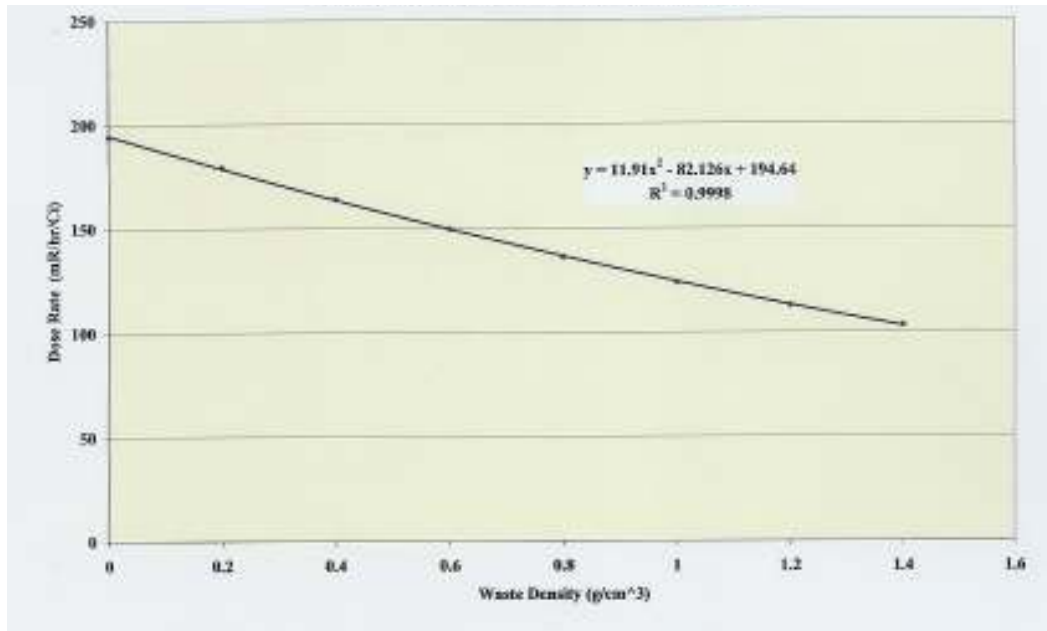
Determination of the ^{137}Cs activity for a container allows the calculation of the following quantities for each RH container measured:

- Activity in curies (Ci) and mass in grams (g) for each of the other nine WIPP-tracked radionuclides, i.e., ^{241}Am , ^{238}Pu , ^{239}Pu , ^{240}Pu , ^{242}Pu , ^{90}Sr , ^{233}U , ^{234}U , and ^{238}U
- FGE

- PE Ci
- Decay heat in watts
- Associated uncertainty for all values listed in previous bullets

**Table 6. MCNP Input –
Observed Dose Rate As a Function of Waste Density**

Waste Density	Dose Rate mR/hr
0.0	193.993
0.2	179.322
0.4	164.203
0.6	149.743
0.8	136.207
1.0	124.006
1.2	112.991
1.4	103.45



**Figure 8. ANL DTC Correlation Dose Rate Versus Waste Density
For Cs-137 in 30-gallon Drums**

Table 7. Constants Used in Scaling Factor Development

Radionuclide	Specific Activity (Ci/g)	FGE/g	PE-Ci/Ci	Watts/g
U-233	9.76E-03	9.00E-01	3.90	2.84E-04
U-234	6.32E-03	0.00E+00	0.00	1.82E-04
U-235	2.19E-06	6.43E-01	0.00	6.04E-08
U-238	3.40E-07	0.00E+00	0.00	8.62E-09
Pu-238	1.73E+01	1.13E-01	1.10	5.73E-01
Pu-239	6.29E-02	1.00E+00	1.00	1.95E-03
Pu-240	2.30E-01	2.25E-02	1.00	7.16E-03
Pu-241	1.04E+02	2.25E+00	51.00	3.31E-03
Pu-242	3.97E-03	7.50E-03	1.10	1.17E-04
Am-241	3.47E+00	1.87E-02	1.00	1.16E-01
Cs-137	8.80E+01	0.00E+00	0.00	9.74E-02
Ba-137m	5.38E+08	0.00E+00	0.00	2.12E+06
Sr-90	1.38E+02	0.00E+00	0.00	1.60E-01
Y-90	5.44E+05	0.00E+00	0.00	3.01E+03

These values are shown below in Tables 8 and 9 for the hypothetical 10 mR/hr 1-meter dose rate and the observed average dose rate of 230 mR/hr for Container No. 00820, respectively. The reported values listed for radionuclides, FGE, PE Ci, and decay heat values plus uncertainties are all produced as a function of the measured dose rates at 1 meter and the application of the scaling factors discussed below. The values in Table 9 are the actual data that ANL reported in BDR No. ANLRHDTTC06001, based on the radiological characterization observed during the inspection.

Scaling Factor Technical Evaluation

The technical basis and degree to which the scaling factors are representative of the RH TRU wastes for which ANL-CCP requested approval were evaluated during this inspection. The following elements were evaluated and verified:

(1) Waste stream definition

This inspection focused on a group of wastes that ANL-CCP stated were contained in a single waste stream, which included fuel pins that were dissimilar with respect to their radionuclide content. Specifically, they consisted of three fuel types:

- Uranium, Low Enriched Uranium (LEU) and Highly Enriched Uranium (HEU)
- Uranium and plutonium
- Thorium

Table 8. Summary of Reportable Values Using Boundary Condition of 10 mR/hr 1-Meter Dose Rate

Radionuclide	Curie Scaling Factors	Activity (Ci)	Mass Grams	FGE	PE-Ci	Watts	Uncertainty %	Uncertainty Curies	Uncertainty Grams
U-233	2.59E-09	1.87E-10	1.92E-08	1.73E-08	4.80E-11	5.45E-12	81.69%	1.53E-10	1.57E-08
U-234	6.48E-05	4.68E-06	7.41E-04	0.00E+00	0.00E+00	1.35E-07	60.71%	2.84E-06	4.50E-04
U-235	1.99E-06	1.43E-07	6.55E-02	4.21E-02	0.00E+00	3.96E-09	65.33%	9.37E-08	4.28E-02
U-238	2.32E-06	1.68E-07	4.93E-01	0.00E+00	0.00E+00	1.36E-04	51.44%	8.63E-08	2.54E-01
Pu-238	5.70E-02	4.12E-03	2.38E-04	2.69E-05	3.74E-03	1.36E-04	60.82%	2.50E-03	1.45E-04
Pu-239	1.08E-02	1.30E-03	2.06E-02	2.06E-02	1.30E-03	4.03E-05	79.45%	1.03E-03	1.64E-02
Pu-240	1.23E-02	8.91E-04	3.88E-03	8.72E-05	8.91E-04	2.77E-05	75.94%	6.77E-04	2.94E-03
Pu-241	8.11E-01	5.86E-02	5.63E-04	1.27E-03	1.15E-03	1.86E-06	55.78%	3.27E-02	3.14E-04
Pu-242	3.01E-05	2.17E-06	5.47E-04	4.10E-06	1.97E-06	6.40E-08	56.63%	1.23E-06	3.10E-04
Am-241	3.11E-02	2.25E-03	6.48E-04	1.21E-05	2.25E-03	7.51E-05	70.07%	1.57E-03	4.54E-04
Cs-137	1.00E+00	7.22E-02	8.21E-04	0.00E+00	0.00E+00	7.99E-05	31.77%	2.30E-02	2.61E-04
Ba-137m	9.46E-01	6.83E-02	1.27E-10	0.00E+00	0.00E+00	2.69E-04	31.77%	2.17E-02	4.04E-11
Sr-90	6.40E-01	4.62E-02	3.35E-04	0.00E+00	0.00E+00	5.36E-05	33.77%	1.56E-02	1.13E-04
Y-90	6.40E-01	4.62E-02	8.49E-08	0.00E+00	0.00E+00	2.56E-04	33.77%	1.56E-02	2.87E-08
Totals	—	3.00E-01	5.87E-01	6.41E-02	9.33E-03	9.40E-04	—	—	—

TRU Alpha Activity Concentration 1.84E+02 nCi/g
 TRU Alpha Activity 8.56E-03 Ci
 Total ²³⁹Pu Equivalent Activity 9.33E-03 Ci
 Total ²³⁹Pu Fissile Gram Equivalent 6.41E-02 g
 Total Decay Heat 9.40E-04 watts
 Volume Activity 2.64E-03 Ci/liter

**Table 9. Summary of Reportable Values Using Actual Data from Container No. 00820,
Waste Stream AERHDM, Assayed August 10, 2006**

Radionuclide	Curie Scaling Factors	Activity (Ci)	Mass Grams	FGE	PE-Ci	Watts	Uncertainty %	Uncertainty Curies	Uncertainty Grams
U-233	2.59E-09	3.43E-09	3.51E-07	3.16E-07	8.79E-10	9.98E-11	80.25%	2.75E-09	2.82E-07
U-234	6.48E-05	8.58E-05	1.36E-02	0.00E+00	0.00E+00	2.47E-06	58.76%	5.04E-05	7.97E-03
U-235	1.99E-06	2.63E-06	1.20E+00	7.71E-01	0.00E+00	7.24E-08	63.52%	1.67E-06	7.62E-01
U-238	2.32E-06	3.07E-06	9.03E+00	0.00E+00	0.00E+00	7.79E-08	49.12%	1.51E-06	4.44E+00
Pu-238	5.70E-02	7.54E-02	4.36E-03	4.92E-04	6.85E-02	2.50E-03	58.87%	4.44E-02	2.57E-03
Pu-239	1.08E-02	2.38E-02	3.78E-01	3.78E-01	2.38E-02	7.37E-04	77.97%	1.85E-02	2.95E-01
Pu-240	1.23E-02	1.63E-02	7.10E-02	1.60E-03	1.63E-02	5.08E-04	74.39%	1.21E-02	5.28E-02
Pu-241	8.11E-01	1.07E+00	1.03E-02	2.32E-02	2.10E-02	3.41E-05	53.65%	5.75E-01	5.53E-03
Pu-242	3.01E-05	3.98E-05	1.00E-02	7.52E-05	3.62E-05	1.17E-06	54.53%	2.17E-05	5.46E-03
Am-241	3.11E-02	4.12E-02	1.19E-02	2.22E-04	4.12E-02	1.38E-03	68.39%	2.81E-02	8.11E-03
Cs-137	1.00E+00	1.32E+00	1.50E-02	0.00E+00	0.00E+00	1.46E-03	27.87%	3.69E-01	4.19E-03
Ba-137m	9.46E-01	1.25E+00	2.33E-09	0.00E+00	0.00E+00	4.93E-03	27.87%	3.49E-01	6.49E-10
Sr-90	6.40E-01	8.46E-01	6.13E-03	0.00E+00	0.00E+00	9.81E-04	30.13%	2.55E-01	1.85E-03
Y-90	6.40E-01	8.46E-01	1.56E-06	0.00E+00	0.00E+00	4.68E-03	30.13%	2.55E-01	4.69E-07
Totals	—	5.50E+00	1.08E+01	1.17E+00	1.71E-01	1.72E-02	—	—	—

TRU Alpha Activity Concentration	8.66E+03 nCi/g
TRU Alpha Activity	1.57E-01 Ci
Total ²³⁹ Pu Equivalent Activity	1.71E-01 Ci
Total ²³⁹ Pu Fissile Gram Equivalent	1.17E+00 g
Total Decay Heat	1.72E-02 watts
Volume Activity	4.84E-02 Ci/liter

The following definition is taken from page 12 of the WCPIP:

A waste stream is defined as waste material generated from a single process or from an activity which is similar in material, physical form and radiological constituents. Only those containers that can be related to a particular waste stream will be contained in that waste stream.

In light of the apparent differences among the three fuel types listed above, the consolidation of these drums in a single waste stream bears investigation. The radionuclide profiles of the three fuel types are clearly different; however, following irradiation these fuel types have a common, salient characteristic, i.e., the presence of fission and activation products. Of these, ^{137}Cs is the main interest due to its physical half-life (~30.2 years) and high transition probability photon emission at 662 keV. There are other fission and activation products but these are not an issue to this approach because they have short physical half-lives and have decayed or, more importantly, their contribution is insignificant relative to ^{137}Cs . In a sense, one could consider that these materials have been treated by their exposure to the intense neutron field produced during irradiation (fission). The materials' characteristics that have bearing on DTC have been reduced to a common element, i.e., the predominance of ^{137}Cs , after irradiation, and the differences of the fuel's pre irradiation composition do not affect the radiological characterization process. The EPA inspection team concluded that the assignment of all containers to a single waste stream was technically justified and technically supportable.

(2) Technical aspects and derivation of scaling factors

The EPA inspection team evaluated the following aspects:

- Activity values used are derived from modeling and statistical metrics that support their use, and the statistical metrics include mean and standard deviation values for each measured radionuclide.
- Isotopic activity values are normalized to the major radionuclide(s) responsible for the external container dose rate, i.e., ^{137}Cs .
- The calculated results are used to develop the scaling factors and convert the measured dose rate to radionuclide activity levels.
- The expected dose rates at a distance of 1 meter from the outer surface of the waste container, at the mid-height of the container, have been calculated as a function of the waste's activity, and the calculation accounts appropriately for container properties i.e., fill height or (apparent) density, waste type, shielding effects of the container and/or liner wall.
- Calculations supporting the scaling factors are performed using appropriate shielding analysis techniques, i.e., MCNP5 and MicroShield 7.00.
- Computer programs (ORIGEN2.2) used for calculations of the activities of the 10 WIPP-tracked radionuclides account for the following:

- The beginning conditions of the fuel used to produce the TRU isotopes
- Exposure of fuel to neutron fields in a nuclear reactor (fission)
- Change in radionuclides following irradiation
- Reactor neutron energy spectrum is known or calculated in order to determine the effective cross-sections of radionuclides leading to the creation of 10 WIPP-tracked radionuclides
- Appropriate cross-sections are used or generated for each reactor condition
- Fuel exposure history is used to calculate isotope generation and depletion

(3) Documentation of technical aspects

Development of the scaling factors is documented in ten calculation packages that were prepared by Jene Vance and Jim Holderness (see Section 8.2.1). These packages address a variety of aspects, including:

- Verification of MCNP5, MicroShield 7.00 and ORIGEN2.2
- Evaluation of all potential contributors to a container's dose rate, specifically ^{60}Co and other gamma emitting members of the ^{232}U decay series, e.g., ^{228}Ac and ^{208}Tl
- Uranium and plutonium relationship in the fuel pins from which the wastes originated
- The nature and history of the fuel pins, reactor cross-sections, and operating histories
- Potential sources of uncertainty, discussed below

The EPA inspection team members reviewed a subset of these packages in detail and discussed them with the documents' authors and Mark Doherty. During these discussions, several aspects were probed in detail and, apart from minor discrepancies with respect to specific documentation details; the calculation packages were found to be technically adequate.

(4) Evaluation of Total Measurement Uncertainty (TMU)

The development of TMU for ID-ANLE-S5000 is based on the propagation of uncertainties present in all aspects of the determination of the radiological constituents of RH TRU waste. The TMU determination included the contributions of:

- Drum weight measurement
- Measurement uncertainty of ^{137}Cs
- MCNP5 issues
- MicroShield issues
- Other gamma emitters
- Individual pins to the total
- Specific pins in a single drum
- Burnup history
- Reported burnup
- Internal code issues

- Contributions from unirradiated pins
- Modeling

EPA raised a technical concern regarding TMU with respect to the appropriateness of the statistical model during the EPA RH Inspection at INL, see EPA Baseline Inspection Report No. EPA-INL-CCP-RH-6.06-8. This technical issue resulted in INL-CCP reissuing calculation package INL-RH-06 that provides the technical support for the calculation of TMU at both INL and ANL. The EPA Inspection Team reviewed the applicability of the reissued procedure to the ANL RH waste stream and determined that it was technically appropriate and it correctly addressed the TMU issue.

The EPA inspection team did not have any technical issues or concerns relative to the development and application of radionuclide scaling factors based on the objective evidence reviewed during this inspection.

The application of scaling factors for isotopic determination other than those observed during this baseline inspection and documented in CCP-AK-ANLE-501 is a T1 change. (See Table 1, where this is included as a T1 change). Likewise, the use of any alternate radiological characterization technique procedure other than DTC with the established scaling factors cited in the previous sentence, or substantive modification thereof, is a T1 change. (See Table 1, where this is included as a T1 change). Any new waste stream not approved under this baseline inspection or the addition of containers to Waste Stream AERHDM that require changing the established radionuclide scaling factors is a T1 change. (See Table 1, where this is included as a T1 change).

Summary of Radiological Characterization Findings and Concerns

The EPA inspection team did not identify any findings or concerns related to radiological characterization during this inspection.

Baseline Approval

EPA approves the ANL-CCP radiological characterization process that the EPA inspection team evaluated during the baseline inspection and consists of the following two techniques used jointly for containers of RH TRU in one waste stream, AERHDM and consists of the following:

- The determination of the 10 WIPP-tracked radionuclides based on the DTC procedure presented in CCP-TP-504
- The application of radionuclide scaling factors derived as documented in CCP-AK-ANLE-501 and supported by the calculation packages referenced in Section 8.2.1

Radiological Characterization Tiers

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

T1 radiological characterization changes that will require EPA review and approval prior to implementation and apply to any waste stream not evaluated during the baseline inspection include the following:

- Use of any alternate radiological characterization procedure other than DTC with established scaling factors as documented in CCP-TP-504 and CCP-AK-ANLE-501, Revision 0, respectively, or substantive modification thereof^{***}
- Any new waste stream not approved under this baseline or addition of containers to waste stream AERHDM that require changing the established radionuclide scaling factors
- Application of new scaling factors for isotopic determination other than those documented in CCP-AK-ANLE-501

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

T2 radiological characterization changes that do not require EPA approval prior to implementation but require a brief description of the changes to the documents along with the notification, include the following:

- Notification to EPA that revisions of CCP-AK-ANLE-501 or CCP-TP-504 that require CBFO approval** are complete

Following EPA approval, ANL-CCP will provide EPA with information concerning T2 changes on a quarterly basis. When notifying EPA as a T2 change that additional information is available, the notification should provide a brief description of the type of additional information. EPA will then determine whether to seek the new, additional information from ANL-CCP. EPA will evaluate these changes and communicate with ANL-CCP as to whether the changes raise any concerns and require an ANL-CCP response, or whether ANL-CCP can continue to implement the changes. Consistent with EPA's authority under 194.24(h) EPA may request information relative to these changes if EPA deems the information is necessary to ensure continued compliance with EPA regulations.

8.3 Visual Examination

WC Element Description

The VE process used for identifying contents of RH waste drums allows the review of existing audio/video recordings made at the time of packaging to generate VE data. Two VE operators identified and documented the waste contents of the containers examined by this technique. VE determines the following aspects of RH TRU waste:

- Confirmation that the waste matches the waste stream description
- Description of the container contents including waste material parameters (WMP)
- Confirm the presence or absence of residual liquid that exceed one percent of the volume of the waste container

Procedure CCP-TP-500 was used for conducting VE of RH TRU waste at ANL-CCP.

Documents Reviewed

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

- CCP-TP-500, Revision 2, Remote-Handled Waste Visual Examination, June 19, 2006
- CCP-QP-002, Revision 21, Training and Qualification Plan, June 13, 2006
- Remote-Handled TRU Waste Characterization Program Implementation Plan, Revision 0D, October 30, 2003
- VE Batch Data Report (BDR): RHANLVE060001

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

- VE Batch Data Report, RHANLVE060001
- Audio/visual recording for BDR RHANLVE060001
- Qualification cards for VE operators
- Qualification card for SME/VEE
- VEE appointment letter, dated April 17, 2006
- List of Qualified Individuals (LOQI) for ANLE RH VE program
- Attendance Sheets for CCP-AK-ANLE-500 training
- Processing information for BDR RHANLVE060001
- AK tracking spreadsheet for containers in waste stream AERHDM
- Acceptable Knowledge Summary Report Training Certificates for Argonne Remote-Handled Debris Waste Stream – AERHDM

Technical Evaluation

During the inspection, the technical elements of the VE process were evaluated using the checklist contained in Attachment A.2. These areas are summarized below:

(1) Overall procedural technical adequacy and implementation

The VE procedure, documented in CCP-TP-500, Revision 2, provided instructions to VE personnel for performing VE by review of existing audio/visual recordings. The procedure was technically adequate and complete. Initially, the operators did not make a complete inventory of the waste items, but the inventories were revised approximately two months after the original VE events. At the time of the on-site inspection, the single BDR generated, RHANLVE060001, contained complete waste inventories. EPA requires that ANL-CCP notify EPA through a T2 change notice upon completion of any revisions of any of the VE procedures observed during this baseline inspection that require CBFO approval. Consistent with EPA's authority under 194.24(h), EPA may request these revisions and other related information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.)

The use of any new VE technique not observed during this baseline inspection for one retrievably-stored debris waste stream AERHDM using the trained personnel, documentation, and procedures discussed in this report is a T1 change. (See Table 1, where this is included as a T1 change.) Additionally, using the VE process evaluated during this inspection for a Summary Waste category that is not a debris waste, is a T1 change. (See Table 1, where this is included as a T1 change.)

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

EPA reviewed selected data sheets contained in BDR RHANLVE060001 in conjunction with the audio/visual recordings to ensure consistency between the visual and written records. The data sheets and audio/video recordings for Container Nos. 00816, 00826, 00825, and 00815 were reviewed. EPA did not identify any discrepant information for these containers. During this review, a VE operator explained the process and how decisions were made with regard to identification of WMPs. However, the operator interviewed could not explain how they were able to answer certain questions on the VE data sheet, e.g., "The waste is consistent with the waste stream description and waste matrix code (Summary Category Group)?" "Yes" had been entered on the data sheet for each container in BDR RHANLVE060001 in response to this question, but the operator was unable to provide the information about the waste stream description that was necessary to answer this question. EPA included this issue on an EPA Inspection Issue Tracking Form (see Attachment B.2 for a copy of this form), described below.

EPA Concern No. ANL-CCP-RH-VE-06-002C: The Independent Technical Reviewer (ITR) had not fully implemented the requirement for complete inventory put in place on June 15, 2006, at the time BDR #RHANLVE060001 was signed off on July 19, 2006. The ITR signed off on the checklist on July 19, 2006; however, it was then corrected to reflect the "complete inventory" requirement on August 25, 2006. The ITR initiated the change after he fully understood the expected criteria of "complete inventory" based on the issue at INL. At the time of the inspection, the VE data had been revised to include a complete inventory of the waste items in each container. EPA considers this concern closed. The audio/video recordings did not show the 7.5-gallon cans being loaded into the 30-gallon containers, but the cans and containers were

associated through the original packaging information and this information was included in the BDR for each container. VE operators confirmed the absence/presence of prohibited items in each can, and if operators were not able to verify this information, an NCR was to be generated and the containers were rejected.

Resolution: A formal response to this concern was not required.

Status of Concern: Based on discussions with ANL-CCP, EPA considers this concern to be closed.

EPA requires that ANL-CCP notify EPA through a T2 change notice regarding the addition of any new S5000 debris waste stream. Consistent with EPA's authority under 194.24(h), EPA may request information relative to any new debris waste streams) if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.)

(3) Documentation of VE activities was examined.

Two operators generated VE data for RH containers from review of audio/video recordings. The operators reviewed existing recordings and completed the required data sheets from their observations. The container inventories initially generated by the operators were incomplete, but this issue was identified by ANL-CCP and the inventories were revised. At the time of the on-site EPA inspection, all of the inventories for the non-rejected containers in BDR RHANLVE060001 were complete. At the end of the VE event, the operators assign percentages to each WMP and manually calculate the weight of each WMP using these percentages and the weight of the waste contained in the cans. Operators did not retain any records for the manual calculations they performed and these calculations were not verified during the ITR review. Completed data generation and project level review checklists were included in the data package that EPA reviewed. The Visual Examination Expert (VEE) who performed the ITR review on BDR RHANLVE060001 failed to recognize that not all data were recorded. This issue was documented on EPA Inspection Issue Tracking Form (see Attachment B.1 for a copy of this form) and the three aspects of this issue are presented below.

EPA Concern No. ANL-CCP-RH-VE-06-001CR, Part 1: The method of manually calculating the weights of Waste Material Parameters (WMP) is not contained within the existing procedure. Failure to document this process in the procedure may lead to the use of inconsistent and undocumented methodologies for this calculation.

Resolution: ANL-CCP revised procedure CCP-TP-500 and removed the requirement to estimate WMP weights because it is not required by the WCPIP. Upon completion of the procedural modification, ANL-CCP provided EPA a copy of the revised procedure that was reviewed and found to be acceptable.

Status of Concern: EPA considers this part of the concern to be closed.

EPA Concern No. ANL-CCP-RH-VE-06-001CR, Part 2: The VE ITR is required to review all manual calculations, but the calculation of WMP weights is not reviewed and the requirement to review it is not contained in any ITR checklist. Failure to do so removes the only required check of the calculation on which WMP quantities are based.

Resolution: Procedure CCP-TP-500 was revised and calculation of the WMP weights no longer requires verification. Upon completion of the modification to CCP-TP-500, ANL-CCP provided EPA a copy of the revised procedure that was reviewed and found to be acceptable.

Status of Concern: EPA considers this part of the concern to be closed.

EPA Concern No. ANL-CCP-RH-VE-06-001CR, Part 3: VE operators are completing “Visual Examination Data Form” without the knowledge necessary to make the correct decisions regarding specific items. For example, checking *yes* in response to the question, “The waste is consistent with the waste stream description?” When questioned, a VE operator could not explain how he was able to answer this question. Confirmation of waste stream description is essential to AK confirmation required by 40 CFR 194.24(c). The VE operator is responsible for deciding if the drum examined is part of the waste stream.

Resolution: ANL-CCP has provided additional training for VE operators. Upon completion of the training, ANL-CCP submitted objective evidence of the training to EPA and this was found to be acceptable.

Status of Concern: EPA considers this part of the concern to be closed.

EPA requires that ANL-CCP notify EPA through a T2 change notice upon completion of any revisions of any of the VE procedures observed during this baseline inspection that require CBFO approval. Consistent with EPA’s authority under 194.24(h), EPA may request these revisions and other related information if EPA deems it necessary to ensure continued compliance with EPA regulations. (See Table 1 where this is included as a T2 change.)

The use of any new VE technique not observed during this baseline inspection for one retrievably-stored debris waste stream AERHDM using the trained personnel, documentation, and procedures discussed in this report is a T1 change. (See Table 1, where this is included as a T1 change.) Additionally, using the VE process evaluated during this inspection for a Summary Waste category that is not a debris waste, is a T1 change. (See Table 1, where this is included as a T1 change.)

(4) Training for VE personnel was examined.

The site maintains a list of qualified individuals, which is used to ensure that all training is current. During the inspection, the qualification packages for the three RH VE operators were reviewed and found to document adequate training for VE personnel. ANL-CCP’s RH VEE was designated prior to generation of any RH VE data. The VEE was present at the site to train the operators but is not necessarily present when VE events take place. The VEE is, however, available for discussion with the operators either by telephone or e-mail.

The following records were reviewed:

- V E Operator/ITR/TS/FQAO Qualification Card for three operators
- Qualification card for one VEE
- Letter designating RH SME/VEE
- List of qualified RH VE personnel
- Acceptable Knowledge Summary Report Training Certificates for Argonne Remote-Handled Debris Waste Stream – AERHDM

Summary of VE Findings and Concerns

The EPA inspection team identified the two concerns related to VE that are discussed above, along with ANL-CCP's response and the resolution for each concern. Copies of the EPA Inspection Issue Tracking Forms that document these concerns are provided in Attachments B.1 and B.2. EPA considers both concerns to have been adequately addressed and there are no open concerns related to VE resulting from this inspection.

VE Baseline Approval

The VE system for RH waste that the EPA inspection team evaluated during this baseline inspection consisted of the following:

- Trained personnel: VE operators, VEE
- Approved and controlled operating procedures CCP-TP-500, Revision 2; CCP-QP-002, Revision 21
- VE records and supporting data: Visual Examination Data Forms, CCP-TP-500 review checklists, and one VE BDR
- Waste stream AERHDM

Based on the results of this inspection of the VE system implemented by CCP at ANL for RH waste, specifically VE by review of existing audio/visual recordings, EPA approves this process for S5000 waste.

VE Tiers

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

T1 VE changes that require EPA approval prior to implementation:

- VE by reviewing existing audio/visual recordings for Summary waste category not covered by this approval
- VE by any new process for S5000 debris wastes

T2 VE changes that do not require EPA approval prior to implementation but require a brief description of the changes to the documents along with the notification, include the following:

- Notification to EPA that revisions of any VE procedure that require CBFO approval are complete
- Addition of new S5000 debris waste streams

Following EPA approval, ANL-CCP will provide EPA with information concerning T2 changes on a quarterly basis. EPA will evaluate these changes and communicate with ANL-CCP as to whether the changes raise any concerns and require an ANL-CCP response, or whether ANL-CCP can continue to implement the changes. Consistent with EPA's authority under 194.24(h) EPA may request information relative to these changes if EPA deems the information is necessary to ensure continued compliance with EPA regulations.

8.4 Real-Time Radiography

The technical area of RTR was not evaluated during this inspection. If ANL-CCP wishes to use RTR to characterize RH TRU wastes, EPA approval separate from what is contained in this report is required.

EPA is not approving RTR at ANL-CCP. ANL-CCP did not have an operational RTR unit in place at the time of the inspection. ANL-CCP cannot ship RH waste to WIPP using RTR as a WC technique until it is inspected and approved by EPA through a T1 change.

8.5 WIPP Waste Information System

The technical area of WWIS was not evaluated during this inspection. Prior to ANL-CCP using the WWIS to characterize RH TRU wastes, EPA approval separate from what is contained in this report is required.

EPA is not approving the WWIS for entry and tracking of the waste contents of RH debris wastes at this time. Although the WWIS is currently approved by EPA for tracking CH waste, ANL-CCP had not demonstrated its adequacy to enter and track RH waste contents during this baseline inspection. During the comment period for the proposed approval CBFO notified EPA that the WWIS was operational for RH wastes and was ready for EPA evaluation as a T1 change. EPA has begun this evaluation and the results of EPA's T1 evaluation will be provided upon completion separately.

9.0 RESPONSE TO COMMENTS

By the end of the comment period (December 26, 2006), EPA received one set of public comments. (Comments are available from EPA Docket ID No. EPA-HQ-OAR-2006-0881.) EPA evaluated those comments and revised the report accordingly. Attachment C provides the public comments and EPA's response.

10.0 SUMMARY OF RESULTS

ANL-CCP responded to all EPA issues that required a response prior to the inspection closeout on site, as well subsequent to the inspection. These are summarized in the preceding sections. The EPA inspection team members evaluated all of CBFO's responses for completeness and adequacy, and concluded that each EPA issue requiring a response had been resolved satisfactorily. No EPA issues remain open at this time.

10.1 Findings and Concerns

The EPA did not identify any findings during the ANL-CCP inspection. The concerns identified during the inspection, as well as ANL-CCP's responses, are discussed in the preceding sections of this report. Copies of the EPA Inspection Issue Tracking Forms that capture these issues are included in Attachment B. ANL-CCP responded to all EPA findings and concerns that required a response prior to the inspection closeout on site, as well subsequent to the inspection. The EPA inspection team members evaluated all responses for completeness and adequacy, and concluded that each EPA issue requiring a response had been resolved satisfactorily. No EPA issues remain open at this time.

10.2 Conclusions

EPA's inspection team determined that ANL-CCP's RH WC program activities were technically adequate. EPA is approving the ANL-CCP-RH WC program in the configuration observed during this inspection, described in this report, and documented in detail in the checklists in Attachment A. The approval includes the following:

- The AK process for RH retrievably-stored TRU debris in one waste stream, Argonne National Laboratory Waste Stream No. AERHDM, as defined in CCP-AK-ANLE-500, Revision 1, July 18, 2006
- The radiological characterization process using DTC and modeling-derived scaling factors for assigning radionuclide values to one RH waste stream for which the scaling factors are applicable, as described in CCP-AK-ANLE-501, Revision 0
- The VE process for one retrievably-stored RH S5000 debris waste stream AERHDM using the trained personnel, documentation, and procedures discussed in this report.

EPA is not approving the WWIS for entry and tracking of the waste contents of RH debris wastes at this time. Although the WWIS is currently approved by EPA for tracking CH waste, ANL-CCP had not demonstrated its adequacy to enter and track RH waste contents during this baseline inspection. During the comment period for the proposed approval CBFO notified EPA that the WWIS was operational for RH wastes and was ready for EPA evaluation as a T1 change. EPA is in the process of reviewing the WWIS database that has been populated with actual RH waste content data. The results of the T1 evaluation will be provided upon completion. No RH waste can be shipped to WIPP for disposal until EPA approves the WWIS as a T1 change.

EPA is not approving RTR at ANL-CCP. ANL-CCP did not have an operational RTR unit in place at the time of the inspection. ANL-CCP cannot ship RH waste to WIPP using RTR as a WC technique until it is inspected and approved by EPA.

Any changes to the WC activities from the date of the baseline inspection must be reported to and, if applicable, approved by EPA, according to Table 10.

**Table 10. Tiering of RH TRU WC Processes Implemented by ANL-CCP
(Based on September 12–14, 2006 Baseline Inspection)**

RH WC Process Elements	ANL-CCP RH WC Process - T1 Changes	ANL-CCP RH WC Process - T2 Changes*
Acceptable Knowledge (AK)	<p>Any new waste streams not approved under this baseline; AK (1)</p> <p>Modification of the approved waste stream AERHDM to include additional containers beyond the approximately 45 included in CCP-AK-ANLE-500, Revision 1. The 20 <i>additional</i> containers identified in the AK summary as being present are not included in this waste stream approval; AK (1)</p> <p>Substantive modification(s)*** that have the potential to affect the characterization process to CCP-AK-ANLE-500, CCP-AK-ANLE-501 or CCP-AK-ANLE-502; AK (8)</p> <p>Implementation of load management for any RH waste stream; AK (16)</p>	<p>Notification to EPA that the final DTC determination is complete for RH containers in the approved waste stream; AK (3)</p> <p>Notification to EPA when updates are made to AK documentation as a result of WCPIP revisions**; AK (4)</p> <p>Notification that updates have been completed to the following documents:</p> <ul style="list-style-type: none"> • All future revisions of CCP-ANLE-AK-500, CCP-ANLE-AK-501; AK (4) • Listing of the references that document the assembly of fuel pin data and review process; AK (5) • All future revisions of CCP-ANLE-AK-502; AK (8) • CCP-AK-ANLE-500 and CCP-AK-ANLE-502 to address freeze file changes; AK (8) <p>Notification to EPA that the data package for this debris waste stream is completed, including any modifications to the WSPF including the CRR and AK Summary; AK (9), and AK (14)</p> <p>Notification to EPA when AK accuracy reports are completed, prepared annually at a minimum; AK (15)</p>
Radiological Characterization, including Dose-To-Curie (DTC)	<p>Use of any alternate radiological characterization procedure other than DTC with established scaling factors as documented in CCP-TP-504 and CCP-AK-ANLE-501, Revision 0, respectively, or substantive modification thereof***; RC (8.2.2 and 8.2.3)</p> <p>Any new waste stream not approved under this baseline or addition of containers to waste stream AERHDM that require changing the established radionuclide scaling factors; RC (8.2.3)</p> <p>Application of new scaling factors for isotopic determination other than those documented in CCP-AK-ANLE-501; RC (8.2.2 and 8.2.3)</p>	<p>Notification to EPA that revisions of CCP-AK-ANLE-501 or CCP-TP-504 that require CBFO approval** are complete; RC (8.2.2 and 8.2.3)</p>

**Table 10. Tiering of RH TRU WC Processes Implemented by ANL-CCP
(Based on September 12–14, 2006 Baseline Inspection)**

RH WC Process Elements	ANL-CCP RH WC Process - T1 Changes	ANL-CCP RH WC Process - T2 Changes*
Visual Examination (VE)	VE by reviewing existing audio/visual recordings for Summary waste category not covered by this approval; VE (1) & VE (3) VE by any new process for S5000 debris wastes; VE (1) and VE (3)	Notification to EPA that revisions of any VE procedure that require CBFO approval are complete; VE (1) and VE (3) Addition of new S5000 debris waste streams; VE (2)
Real Time Radiography (RTR)	Any use of RTR requires EPA approval	None
WIPP Waste Information System (WWIS)	Any use of WWIS requires EPA approval prior to RH waste disposal	None

* ANL-CCP will report all T2 changes to EPA every three months.

** Excluding changes that are editorial in nature or are required to address administrative concerns. New references that are included as part of the document revision may be requested by EPA.

*** *Substantive modification* refers to a change with the potential to affect ANL's RH WC process, e.g., the use of an inherently different type of measurement instrument or the use of the high range probe as described for CCP-TP-504 for radiological characterization.

11.0 REFERENCES

New Mexico Environment Department, Waste Isolation Pilot Plant Hazardous Waste Facility Permit, 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, Title 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, Carlsbad Area Field Office, “Remote Handled TRU Waste Characterization Program Implementation Plan,” DOE/WIPP-02-3214, Revision 0D, Carlsbad, New Mexico, October 30, 2003.

U.S. Department of Energy, Title 40 CFR Part 191, SUBPART D AND C, Compliance Recertification Application 2004, DOE/WIPP/2004-3231.

U.S. Department of Energy, Carlsbad Area Field Office, “Contact-Handled Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant (CH-WAC),” 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. Nuclear Regulatory Commission, “Contact-Handled Transuranic Waste Authorized Methods for Payload Control (CH-TRAMPAC).”

Attachments A.1 through A.3

ATTACHMENT A.1: ACCEPTABLE KNOWLEDGE (AK) RH CHECKLIST

EPA Inspection No.: EPA-ANLE CCP RH-9.06-8

Inspection Date: September 12-14, 2006

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Objective Evidence/Adequacy
Implementation of Characterization Methods to Satisfy DQOs (WCPIP Section 4.2)			
<p>How are the following DQOs being addressed—any of these that AK is used to determine must be qualified/verified as per Section 4.3, except for the first bullet (defense):</p> <ul style="list-style-type: none"> • Defense determination • TRU waste determination • RH waste determination • Activity determination (total and activity per canister) • Residual liquids • Physical form • Metals • Cellulosics, plastics, rubber 	WCPIP Rev. 0D, Section 4.2; CCP-P0-002, Rev. 16.	Interview of AKEs including Steve Shafer, Kevin Peters, Lisa Watson; examination of objective evidence.	<p>Examples of objective evidence obtained include but are not limited to:</p> <p>CCP-AK-ANLE-500 Rev.1; CCP-AK-ANLE-501 Rev 0, CCP-AK-ANLE-502 Rev. 0, CCP-TP-506 Rev. 2, CRR-ANLE-AERHDM, AK Accuracy Report, WSPF, CRR.</p> <p>It is anticipated that the WCPIP will be revised in the future. One major change expected is the addition of a DQP requiring identification/quantification of the EPA 10 radionuclides. Revisions of several documents are anticipated including many of those listed above. Revisions to any documents reviewed as part of this inspection, but changed due to WCPIP revisions, must be provided to EPA.</p>
Qualification/Verification of AK Data (WCPIP Section 4.3)			
Is AK qualification/verification required because characterization information exists that was generated prior to an established QA Program?	WCPIP Rev. D, Section 4.3, CCP-P0-002, Rev. 16.	Interview of AKEs including Steve Shafer, Kevin Peters, Lisa Watson; examination of objective evidence.	<p>Examples of objective evidence obtained include but are not limited to:</p> <p>CCP-AK-ANLE-502 Rev.0; CCP-AK-ANLE-500</p>
a. If yes, what qualification approach is used and for which characterization data (e.g. Peer Review, Confirmatory Testing, Equivalent QA)	WCPIP Rev. D, Section 4.3, CCP-P0-002, Rev. 16.	Interview of AKEs including Steve Shafer, Kevin Peters, Lisa Watson; examination of objective evidence.	<p>Examples of objective evidence obtained include but are not limited to:</p> <p>CCP-AK-ANLE-502 Rev.0; CCP-AK-ANLE-500</p>
b. If Peer Review performed, does it follow requirements presented in Section 4.3.1 of the PIP?	WCPIP Rev. D, Section 4.3, CCP-P0-002, Rev. 16.	Interview of AKEs including Steve Shafer, Kevin Peters, Lisa Watson.	<p>Examples of objective evidence obtained include but are not limited to:</p> <p>CCP-AK-ANLE-502 Rev.0; CCP-AK-ANLE-500</p>

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Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Objective Evidence/Adequacy
			No Peer Review Performed.
<p>c. If Confirmatory Testing is performed, does it follow requirements presented in Section 4.3.3 of the PIP and which methods are used?</p> <ul style="list-style-type: none"> • 100 % VE at time of packaging • 10-10-all • Representative sample collection to confirm isotopic distribution • 100% NDA • DA • DTC • Other as described in a Confirmatory Testing Plan: <ul style="list-style-type: none"> - VE by review of a percentage of audio/video tapes - Analysis of representative samples for radiological data - VE/radiography of a subpopulation of waste - Qualification of existing radiological sampling and analytical info via modeling (e.g. ORIGEN) • Did the generator submit a Confirmatory Test Plan as described in Section 4.3.3 of the PIP? If so, has CBFO audited and approved the process? Did it contain the following and was it adequate: <ul style="list-style-type: none"> - Description of the waste stream or waste stream lots to which the plan applies - Explicit description of DQOs and QAOs that will be satisfied with the data being qualified - Description of DQOs and QAOs that will NOT be confirmed with the data being qualified, and an explanation of how compliance with those DQOs and QAOs will be demonstrated - Description of the confirmatory testing proposed, including the percentage of waste containers subject to confirmatory testing 	<p>WCPIP Rev. D, Section 4.3, CCP-P0-002, Rev. 16.</p>	<p>Interview of AKEs including Steve Shafer, Kevin Peters, Lisa Watson.</p>	<p>Examples of objective evidence obtained include but are not limited to:</p> <p>CCP-AK-ANLE-502 Rev.0; CCP-AK-ANLE-500; AK Tracking Spreadsheet, CCP-AK-501, DTC Conversion Records, CRR-ANLE-AERHDM, BDRs for containers 00810, 817, 820, 824, 826.</p> <p>CCP performed DTC and examination of all VE tapes/records for each container. CTP described process including required contents of PIP and including DQO and QAO identification (see checklist discussion below).</p>

ATTACHMENT A.1: ACCEPTABLE KNOWLEDGE (AK) RH CHECKLIST

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Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Objective Evidence/Adequacy
<ul style="list-style-type: none"> - Description of how the tested subpopulations will be representative of the waste stream or waste stream lot - Quantitative acceptance criteria for determining that the AK information in question can be qualified as characterization data 			
General Checklist Questions			
<p>Is the scope of the waste for which approval is sought defined? What is it?</p>	<p>WCPIP Rev. 0D, CCP-P0-002, Rev. 16.</p>	<p>Interview of AKEs including Steve Shafer, Kevin Peters, Lisa Watson.</p>	<p>Examples of objective evidence obtained include but are not limited to: CCP-AK-ANLE-500; CCP-AK-ANLE-502.</p> <p>Approval sought for single waste stream AERHDM as defined in CCP-AK-ANLE-500. This includes approximately 45 drums and 50 newly generated waste containers sourced from the AGHCF, and does not include other wastes such as the additional 20 containers identified in the AK Summary but not currently considered part of the waste stream. Changes to the stream to include these new wastes would require EPA notification, as would addition of any new waste streams.</p>
<p>Is the waste TRU by definition as presented in the LWA? (P.L.102-579)</p>	<p>WCPIP Rev. 0D, CCP-P0-002, Rev. 16.</p>	<p>Interview of AKEs including Steve Shafer, Kevin Peters, Lisa Watson.</p>	<p>Examples of objective evidence obtained include but are not limited to: CCP-AK-ANLE-500, CCP-AK-ANLE-501, TRU WAC, C349, P002, U332, U334, U335, U336.</p> <p>CCP does not intend to load manage this stream, but if this is performed EPA notification is required. This includes the inclusion of CH containers in the RH canister.</p>

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Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Objective Evidence/Adequacy
<p>Are any wastes considered (or previously considered) HLW? HLW are prohibited. (P.L.102-579)</p> <p>Are any wastes considered (or previously considered) Spent Nuclear Fuel? (P.L.102-579)</p>	WCPIP Rev. D, CCP-P0-002, Rev. 16.	Interview of AKEs including Steve Shafer, Kevin Peters, Lisa Watson; review of objective evidence.	<p>Examples of objective evidence obtained include but are not limited to:</p> <p>CCP-AK-ANLE-500, CCP-AK-ANLE-501; P593, P592, C121, C332, P001, P002, P023, P032, P055, P380, P412, U013</p>
Personnel and Training			
<p>Who are the AK personnel? Upon interview, do they perform the duties presented in Attachment A, Section 3? Who is the Site Project Manager (SPM)? Upon interview, do they perform the duties presented in Attachment A, Section 3? Who is the Site Project Quality Assurance Officer (SPQAO)? Upon interview, do they perform the duties presented in Attachment A, Section 3? Are the above trained in the following:</p> <ul style="list-style-type: none"> • The RH TRU WCPIP • Non conformance and corrective action processes • The AK Procedure presented in Attachment A of the PIP • Site-specific training relative to the contents of the site's waste streams • Determining radiological contents of individual containers 	WCPIP Rev. D Attachment A; CCP-P0-002, Rev. 16; CCP-QP-001, Rev. 20	Interview of AKEs including Steve Shafer, Kevin Peters, Lisa Watson, Larry Porter, A.J. Fisher; review of objective evidence.	<p>Examples of objective evidence obtained include but are not limited to:</p> <p>Qualification cards and training records including resumes for Kevin Peters, Steve Shafer. Lisa Watson interviewed. During interview, ascertained that personnel were knowledgeable in areas required by the WCPIP.</p>
Compiling AK Documentation and Defining the Waste Stream(s)			
<p>AK documentation must be compiled. What documents have been compiled? Are they among the following:</p> <ul style="list-style-type: none"> • Published documents/controlled databases 	WCPIP Rev. D Attachment A	Interview of AKEs including Steve Shafer, Kevin Peters, Lisa Watson, Review of AK	<p>Examples of objective evidence obtained include but are not limited to:</p> <p>CCP-AK-ANLE-500, CCP-AK-ANLE-501, Source Documents Reference List for</p>

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Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Objective Evidence/Adequacy
<ul style="list-style-type: none"> • Unpublished data • Internal procedures and notes (log books, correspondence, etc) • Engineering Documents • Mission Statements • Other <p>Documentation is among the data used to define the waste stream. Has the waste stream been adequately defined as per the definition of waste stream as presented in the WCPIP: Waste stream is a waste material generated from a single process or from an activity which is similar in material, physical form, and radiological constituents.</p>		Summary and AK Source Document Reference List; examination of selected objective evidence.	<p>AERHDM. Dozens of examples of correspondence (C), Published (P), and unpublished (U) documents were provided by CCP that included various databases, internal procedures/notes, engineering documents, mission statements, Safety Analysis Reports, etc.</p> <p>Waste stream was adequately defined. Note that the source documents reference list included several references not cited in CCP-AK-ANLE 500 or 501, and the reference list did not include a document that tracked or recorded the efforts made to compile and assess AK radiological data for use in DTC. A reference that documents fuel pin data assembly and assessment for use in DTC is required by EPA.</p>
<p>Does additional documentation used to characterize waste and delineate the waste stream include the following:</p> <ul style="list-style-type: none"> • Previous NDA, radiochemistry, dosimetry, and non destructive examination data • Waste generating procedures • Physical, chemical, and radionuclide inputs to the process • Time period that the process took place • Facilities involved • Types of waste generated (waste material parameters) • Process descriptions and flow diagrams • Packaging logs and video tapes • MSDS • Procurement records 	WCPIP Rev. D Attachment A	Interview of AKEs including Steve Shafer, Kevin Peters, Lisa Watson; review of AK Summary and AK Source Document Reference List; examination of selected objective evidence.	<p>Examples of objective evidence obtained include but are not limited to:</p> <p>CCP-AK-ANLE-500, CCP-AK-ANLE-501, Source Documents Reference List for AERHDM; U336, U335, U334, U332, C349, U305, U072, P575, P414, P380, P032, P002, C306</p>

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Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Objective Evidence/Adequacy
<ul style="list-style-type: none"> • Administrative/Process controls used as the basis for the absence of residual liquids • Container-specific information (AK data, i.e. waste container input forms, etc). <p>Were correlations made between CH and RH TRU Waste operations at a site including related CH waste characterization data? If so, are correlations documented on a Correlation and Surrogate Summary Form and is this form adequate and included in the AK Summary?</p>			
<p>Were correlations and similarities with the RH TRU waste operations at other generator/storage sites made, including characterization information for that RH TRU waste stream? If so, are the correlations documented on the Correlation and Surrogate Summary Form and is this form adequate and included in the AK Summary?</p>	WCPIP Rev. D Attachment A	<p>Interview of AKEs including Steve Shafer, Kevin Peters, Lisa Watson; review of AK Summary and AK Source Document Reference List; examination of selected objective evidence.</p>	<p>Examples of objective evidence obtained include but are not limited to:</p> <p>CCP-AK-INL-500, CCP-AK-INL-501, CCP-AK-ANLE-500, CCP-AK-ANLE-501, Correlation/Surrogate Summary Form, P593, P592, C060, P002, U305</p> <p>If containers from this stream are determined to be CH rather than RH, NDA of the drums would occur and the isotopic data would be presented on a Correlation and Surrogate Summary Form that must be provided to EPA.</p>
<p>Has an AK Source Document Reference list been assembled for each AK Summary/waste stream, and have references been assigned unique identifiers (Attachment 2 of Attachment A of the WCPIP)?</p>	WCPIP Rev. D Attachment A	<p>Interview of AKEs/SPM including Steve Shafer, Kevin Peters, Lisa Watson; review of AK Summary and AK Source Document Reference List.</p>	<p>Examples of objective evidence obtained include but are not limited to:</p> <p>CCP-AK-ANLE-500, Source Document Reference List.</p> <p>Reference list is complete and easy to follow.</p>
<p>Have Source Document Summaries been developed per Attachment 5 and are these adequate? Do they identify data limitations?</p>	WCPIP Rev. 0D Attachment A	<p>Review of Source Document Summaries</p>	<p>Examples of objective evidence obtained include but are not limited to:</p> <p>See all Source Documents (C), (P) and (U) provided (D349, P002, U332, etc.). Each source document has a source document</p>

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Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Objective Evidence/Adequacy
			summary attached to the front of the reference that summarizes document contents and provides a location for documenting data limitations.
AK-AK Discrepancy Resolution			
<p>How are AK-AK discrepancy resolutions documented and does the documentation:</p> <ul style="list-style-type: none"> • Identify the affected waste stream(s) • Identify all relevant AK source documents • State the nature of the discrepancy <p>Has there been an instance where an AK-AK discrepancy cannot be resolved or if the resolution results in a failure of a DQO? If so, the waste cannot be shipped to WIPP without further evaluation.</p>	WCPIP Rev. 0D Attachment A	<p>Interview of AKEs/SPM including Steve Shafer, Kevin Peters, Lisa Watson, Larry Porter, Mark Doherty; review of AK Summary and AK Source Document Reference List; examination of selected objective evidence.</p>	<p>Examples of objective evidence obtained include but are not limited to:</p> <p>AK-AK radiological DRs are not provided; EPA expects these to be included in the AK record as they are identified. DR010, DR011, DR013 show ability of CCP to document and resolve discrepancy resolutions. No examples of major issues identified thus far.</p>
Characterization of the Waste – DQO Assessment / Preparation of the AK Summary Report			
<p>What DQOs are assigned by AK? How are each to be qualified/verified (peer review, confirmation, equivalent QA program)</p> <ul style="list-style-type: none"> • Defense determination • TRU waste determination • RH waste determination • Activity determination (total and activity per canister) • Residual liquids • Physical form • Metals • Cellulosics, plastics, Rubber <p>For each DQO related to AK, AK personnel must identify the DQO, supporting AK information, justify the assignments/conclusions, reference the AK Source Documents and applicable pages supporting the assessment, method of 40 CFR 194.22(b) will be qualified</p>	WCPIP Rev. 0D Section 4	<p>Interview of AKEs/SPM including Steve Shafer, Kevin Peters, Lisa Watson, Larry Porter, Mark Doherty; review of AK Summary and AK Source Document Reference List; examination of selected objective evidence</p>	<p>Examples of objective evidence obtained include but are not limited to CCP-AK-ANLE-500 and CCP-AK-ANLE-502. CCP added a Chapter to the AK Summary that addresses DQO assessment.</p>

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<p>Have applicable DQOs been addressed as follows:</p> <ul style="list-style-type: none"> • Has adequate review of AK information been performed to determine whether the waste was generated by defense activities or is commingled with RH TRU waste generated by defense activities? This determination will be established by the AK data compiled. • Review the AK information to determine the nuclear properties of the waste stream. The nuclear properties relevant to RH TRU waste include: TRU activity of the waste stream greater than 100 nCi/g of waste. Is this TRU waste? Will load management take place? • What information is included in the AK Record and AK Summary to demonstrate that the waste is RH waste? Dose equivalent rate equal to or greater than 200 mrem/hr and less than 1,000 rem/hr at the surface of the payload container. • Does the AK record adequately present, support, and report activity of the 10 required radionuclides (TRU isotopes ²³⁸Pu, ²³⁹Pu, ²⁴⁰Pu, ²⁴²Pu, and ²⁴¹Am; and non-TRU isotopes ¹³⁷Cs, ⁹⁰Sr, ²³³U, ²³⁴U, and ²³⁸U)? Furthermore, does AK provide information to determine the total activity in each canister? Must be less than 23 curies per liter. • Are AK records used to calculate, compute, or otherwise derive the total activity and/or TRU activity of the waste and the records? If so, were they qualified by peer review, confirmation, or equivalent QA (see relevant checklists/analysis for these elements, if performed)? Were data collected under an EPA approved program? If so, the records alone may be used to satisfy DQOs; otherwise, the above characterization objectives must be met by collecting additional data during packaging, etc. Were data that would be 	<p>WCPIP Rev. 0D Section 4</p>	<p>Interview of AKEs/SPM including Steve Shafer, Kevin Peters, Lisa Watson, Mark Doherty, Larry Porter; review of AK Summary and AK Source Document Reference List; examination of selected objective evidence</p>	<p>Examples of objective evidence obtained include but are not limited to: CCP-AK-ANLE-500, CCP-AK-ANLE-502, CCP-AK-ANLE-501 Rev. 0, CCP-AK-ANLE-502 Rev. 0, CCP-TP-506 Rev. 2, CRR-ANLE-AERHDM, U001, P599, C331, C330, U015, C349, P002, U332, U334, U335, U336, P593, P592, C121, C332, P001, P002, P023, P032, P055, P380, P412, U013, C332, C333, P306</p> <p>AK record includes defense determination supporting documents. AK record includes data that support TRU and RH designation of waste noting that the RH determination will be made through measurement rather than the AK record. Data pertaining to the EPA 10 radionuclides is present in the AK record, and ANLE did a separate radiological analysis similar to that performed by CCP, but performed on a per campaign rather than waste stream basis; this analysis provide some isotopic information. Note that confirmation is used for all verification except for the defense determination. WMPs identified via waste disposal records and can be used to assess waste stream assignments; examination of VE tapes/records is performed separately from the AK effort. Note that EPA expects the AK record to include information pertaining to waste storage that would identify whether any residual liquids due to post container inundation or management might have occurred. Also, load management is not planned, but would require direct notification of EPA if it was done.</p>

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<p>considered AK, collected and assembled under an EPA qualified program, and were those data used? If so, what was it and how was it used? (E.g., identification of SCG for use in DTC)</p> <ul style="list-style-type: none"> • Has AK been used to compile information regarding the waste stream waste material parameters to provide a detailed description of the waste stream in accordance with the format of the AK Summary Report? • Has AK information been used to determine the absence of residual liquids? This review may include waste packaging procedures and other documented administrative controls such as training records that identify control of residual liquids. It may also include previous waste characterization data or information from waste-container-specific packaging logs. The criterion in the DQO is that residual liquids must be less than 1 percent by volume of the waste container. 			
AK Summary Report Preparation			
<p>Has an AK Summary been prepared and does it follow the format specified in Attachment 1? The report shall include the following:</p> <ul style="list-style-type: none"> • Program and waste stream narrative • Sections as defined in the WCPIP • Detailed description of the waste stream including information on, for example, specific waste matrix materials and fill volumes • The report shall address all of the DQOs as noted in previous steps with appropriate justifications and references in the text 	WCPIP Rev. 0D Attachment A	Interview of AKEs including Steve Shafer, Kevin Peters, Lisa Watson; review of AK Summary and AK Source Document Reference List; examination of selected objective evidence	<p>Examples of objective evidence obtained include but are not limited to:</p> <p>CCP-AK-ANLE-500. The report includes required sections, but some references in the back of the report are not applicable to Argonne, and some references pertinent to ANLE on the Source Document Reference List are not included in the AK Summary. Additionally, CCP committed to a freeze file change to the text to address why AK-DTC data comparison with respect to AK accuracy is not appropriate. Furthermore, it is expected that this document might be among those changed when a new WCPIP is implemented. Therefore, provision to EPA of all revisions to CCP-AK-ANLE-</p>

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			500 is required.
<p>Have the following documents been completed in addition to the AK Summary; are they available for EPA review and are they technically adequate?</p> <ul style="list-style-type: none"> • AK Waste Summary Report • AK Source Document Reference List • Correlation and Surrogate Summary Form • AK discrepancy resolution documentation • AK source document summaries 	WCPIP Rev. 0D Attachment A	Interview of AKEs including Steve Shafer, Kevin Peters, Lisa Watson; review of AK Summary and AK Source Document Reference List; examination of selected objective evidence.	<p>Examples of objective evidence obtained include but are not limited to:</p> <p>CCP-AK-ANLE-500; AK Source Document Reference List, Correlation and Surrogate Summary Form, DR010, DR011, DR013. Source Document Summaries are placed on each correspondence (C), published (P), and unpublished (U) document.</p>
<p>Have all of these been provided to the SPM for review, as required in Section 6.7 of the WCPIP Attachment A? Did the AK personnel recommend how the SPM should assess and qualify the information? (6.8)</p>	WCPIP Rev. 0D Attachment A	Interview of AKEs including Steve Shafer, Kevin Peters, Lisa Watson; review of AK Summary and AK Source Document Reference List; examination of selected objective evidence.	<p>Examples of objective evidence obtained include but are not limited to:</p> <p>Characterization Reconciliation Report and Waste Stream Profile Form. Interview with SPM indicated he had all information cited in Section 6.7 available for review. It was not determined that AK personnel recommend how the SPM assess data, as the SPM did so independently.</p>
Reconciling Compiled AK Information			
<p>Has the SPM Reviewed the AK Summary Report, AK Source Document Reference List, Correlation and Surrogate Summary Forms, the referenced source document summaries, if applicable, batch data reports from any confirmatory activities such as VE or NDA and, if applicable, supplemental data collected during repackaging using an approved technique, to determine if the AK record is reconciled and is adequate to characterize the waste stream or waste stream lot and satisfy the relevant DQOs?</p>	WCPIP Rev. 0D Attachment A	Interview of Larry Porter; review of the AK Summary Report, Correlation and Surrogate Summary forms, BDRs, and other supporting verification activities.	<p>Examples of objective evidence obtained include but are not limited to:</p> <p>CCP-AK-ANLE-500; CCP-AK-ANLE-502, AK Source Document Reference List, Correlation and Surrogate Summary Forms; source document summaries (as included for each source document provided), and BDR for Drum C810.</p>

ATTACHMENT A.1: ACCEPTABLE KNOWLEDGE (AK) RH CHECKLIST

EPA Inspection No.: EPA-ANLE CCP RH-9.06-8

Inspection Date: September 12-14, 2006

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Objective Evidence/Adequacy
Discrepancies between the AK record and confirmatory test results identified during this reconciliation process must be resolved and documented. What is the AK-measurement discrepancy resolution process employed and is it satisfactory? Does it involve reevaluation of the AK record, reassignment of waste stream parameters, and a revision to the AK Summary Report?	WCPIP Rev. 0D Attachment A	Interview of AKEs/SPM including Steve Shafer, Kevin Peters, Lisa Watson, Mark Doherty, and Larry Porter; review of AK Summary and AK Source Document Reference List; examination of selected objective evidence.	Examples of objective evidence obtained include but are not limited to: WSPF, CRR. No discrepancies between the AK Record and the confirmatory test results were found. However, ANLE performed a detailed analysis of the stream based on AK using a similar process as that used by CCP. Comparison of results will bolster use of the waste stream scaling factor, assuming that the results are comparable. Therefore, EPA requires provision of all DTC radiological data (DTC conversion records) summarizing DTC results for the purposes of AK-DTC comparison.
AK Accuracy			
Has the SQAQ, consistent with the requirements of Section 4.1.1.2 of the WCPIP, reviewed the AK Summary Report, confirmatory test data, identified AK discrepancies, and prepared an AK Accuracy Report? This report will identify the percentage of containers that have been assigned to another SCG, as well as radiological issues.	WCPIP Rev. 0D Attachment A	Interview of A.J. Fisher; examination of AK Accuracy Report.	Examples of objective evidence obtained include but are not limited to: AK Accuracy Report for initial containers, stream AERHDM. The report did not consistently indicate that accuracy would be based both on waste stream and summary category group reassignment as required by the WCPIP. EPA noted this in concern No. EPA-ANL-RH-CCP-09-001C, and expects that the concern will be reconciled in the next AK Summary that may also include modifications to address WCPIP changes.
How did the SQAQ determine what is to be considered a "significant" radiological discrepancy and is this determination technically sufficient and adequate?	WCPIP Rev. 0D Attachment A	Interview of A.J. Fisher; examination of AK Accuracy Report.	Examples of objective evidence obtained include but are not limited to: AK Accuracy Report; CCP-AK-ANLE-502. CCP committed to freeze file changes to CCP-AK-ANLE-502 and CCP-AK-ANLE-500 that both address why

ATTACHMENT A.1: ACCEPTABLE KNOWLEDGE (AK) RH CHECKLIST

EPA Inspection No.: EPA-ANLE CCP RH-9.06-8

Inspection Date: September 12-14, 2006

Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Objective Evidence/Adequacy
			comparison of AK and DTC data, with respect to accuracy, is not appropriate. CCP-AK-ANLE-502 was also revised to clarify how the mass spectrometry data are used in the comparison process.
Has the AK Accuracy report been updated annually? Even if the report is only updated annually, will they continually assess AK Accuracy?	WCPIP Rev. 0D Attachment A	Interview of A.J. Fisher; examination of AK Accuracy Report.	Examples of objective evidence obtained include but are not limited to: AK Accuracy Report. In the past CCP has performed AK Accuracy on a lot basis. Provision of AK Accuracy reports to EPA as they are prepared, is required.
Has the AK Accuracy fallen below 90%? If so, the site shall document this as a significant condition adverse to quality as defined by the CBFO QAPD. The site shall notify the CBFO of this condition and implement appropriate corrective actions before proceeding with further characterization activities on the affected waste stream(s).	WCPIP Rev. 0D Attachment A	Interview of A.J. Fisher; examination of AK Accuracy Report.	Examples of objective evidence obtained include but are not limited to: Accuracy reports, as revised to address WCPIP and EPA concerns is required, but it is anticipated that these revisions will not show that the accuracy has fallen below 90%.
Preparation of the CRR			
Has the SPM reviewed the qualified AK characterization information and the corresponding required DQOs and documented this review in an RH TRU waste AK Characterization Reconciliation Report (CRR)? At a minimum the CRR shall include: <ul style="list-style-type: none"> • Specification of applicable site and waste stream • A listing of each DQO • Data from the AK record that addresses each DQO • AK source document references that support/provide the data • A listing of AK record discrepancy resolutions, if any, that are relevant to each DQO 	WCPIP Rev. 0D Attachment A; CP-TP-506 Rev. 2	Review of the CRR for select ANLE RH waste stream; interview of Larry Porter, SPM.	Examples of objective evidence obtained include but are not limited to: WSPF and CRR; BDRs for containers 00810, 815, 817, 820, 824, 826. CRR shall be revised to include WCPIP revisions that recognize identification of EPA 10 radionuclides as a DQO. The CRR included information required by the WCPIP Attachment A.

ATTACHMENT A.1: ACCEPTABLE KNOWLEDGE (AK) RH CHECKLIST

EPA Inspection No.: EPA-ANLE CCP RH-9.06-8

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Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Objective Evidence/Adequacy
<ul style="list-style-type: none"> • Documentation, including specific references, of how the AK data for each DQO were qualified, such as batch data reports, corroborative data, proceedings of a peer review, etc. • Radiography and/or visual examination summary to document that liquids greater than 1 percent are absent from the waste and to confirm AK concerning the physical properties of the waste • A summary presentation of radiological measurement data used to meet the DQOs and to confirm AK • A complete AK summary • A complete listing of all container identification numbers used to generate the WSPF, cross-referenced to each batch data report • A listing of AK discrepancies generated by an AK qualification process and the corresponding resolutions • Signature of the SPM 			
Has the SPM verified that the applicable QAOs (accuracy, completeness, representativeness, and comparability) associated with the AK process have been met?	WCPIP Rev. 0D Attachment A; CCP-TP-506 Rev. 2	Review of the CRR for select ANLE RH waste stream; interview of Larry Porter, SPM.	Examples of objective evidence obtained include but are not limited to: WSPF, CRR. Applicable QAOs have been included on the CRR.
Preparation of the Waste Stream Profile Form			
Has the SPM completed the Waste Stream Profile Form (WSPF) (Attachment 4) based on AK characterization and confirmation results and other relevant characterization data? Is the form complete and adequate/accurate?	WCPIP Rev. 0D Attachment A	Review of the WSPF and related attachments; interview of Larry Porter, SPM.	Examples of objective evidence obtained include but are not limited to: Draft WSPF and related attachments (AK Summary and CRR) See comments pertaining to the AK Summary and CRR. Note that the WSPF was a draft version prepared for audit purposes only; EPA must be provided the final version of the WSPF once it is

ATTACHMENT A.1: ACCEPTABLE KNOWLEDGE (AK) RH CHECKLIST

EPA Inspection No.: EPA-ANLE CCP RH-9.06-8

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Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Objective Evidence/Adequacy
			<p>completed and approved.</p> <p>EPA also requires provision of all forthcoming DTC results, not just those that might be summarized in the CRR, including the radiological data (identification/quantification) of the EPA radionuclides so that EPA may compare this information with AK data.</p>
<p>Have the WSPF, the RH AK Summary Report and the Characterization Reconciliation Report, resulting from waste characterization activities, been transmitted to the Department of Energy Carlsbad Field Office (DOE/CBFO). Only RH TRU waste that is characterized in accordance with the EPA requirements and WCPIP will be accepted for disposal at the WIPP.</p>	WCPIP Rev. 0D Attachment A	<p>Review of the WSPF and related attachments; interview of Larry Porter, SPM.</p>	<p>Examples of objective evidence obtained include but are not limited to:</p> <p>Draft WSPF, CRR, AK Summary for CCP-AK-ANLE-500. Only draft version were available at the inspection; EPA must be provided the final version of the WSPF and related attachments once completed and approved.</p>
Records			
<p>Have the following records been generated and what is the disposition of these records?</p> <ul style="list-style-type: none"> • AK Summary Report (Attachment 1) • AK Source Document Reference List (Attachment 2) • Correlation and Surrogate Summary Form (Attachment 3) • Waste Stream Profile Form (Attachment 4) • AK Source Document Summary (Attachment 5) • Characterization Reconciliation Report • AK Source Documents • AK Training Records • AK Discrepancy Resolution Documentation • AK Accuracy Report 	WCPIP Rev. 0D Attachment A	<p>Interview of AKEs Kevin Peters, Steve Shafer, Lisa Watson; examination of required references as listed (objective evidence).</p>	<p>Examples of objective evidence obtained include but are not limited to:</p> <p>CCP-AK-ANLE-500, CCP-AK-ANLE-501, AK Source Document Reference List, Correlation and Surrogate Summary Form, draft WSPF including the CRR, requested C, U, and P source documents, training records for K. Peters and S. Shafer, DR010, DR011, DR013, AK Accuracy Report (current containers waste stream AERHDM).</p> <p>Lisa Watson verified that all documents are included at the CCP Files in Carlsbad, New Mexico.</p>

ATTACHMENT A.1: ACCEPTABLE KNOWLEDGE (AK) RH CHECKLIST

EPA Inspection No.: EPA-ANLE CCP RH-9.06-8

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Required Technical Elements	Procedure Location/Adequacy	Verification of Activity	Objective Evidence/Adequacy
Confirmatory Test Plan			
	WCPIP Rev. 0D Attachment A	Interview of AKEs Kevin Peters, Steve Shafer, and Mark Doherty, and examination of objective evidence.	Examples of objective evidence obtained include but are not limited to: CCP-AK-ANLE-502, Rev. 0. The test plan requires revision to move the AK accuracy assessment discussion to a more appropriate location, clarify the use of mass spec data, and clarify why AK-DTC data comparisons as part of AK Accuracy are inappropriate. CCP committed to these changes in a Freeze File change. EPA requires provision of revisions to CCP-AK-ANLE-502 to verify that these freeze file changes were made, and to assess changes implemented to address WCPIP modifications.

ATTACHMENT A.2: RH RADIOLOGICAL CHARACTERIZATION CHECKLIST: DOSE-TO-CURIE

EPA Inspection No.: EPA-ANL-CCP-RH-9.06-8

Inspection Date: September 12-14, 2006

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
Technical Documents/Procedures					
Identify all ANL-CCP documents that provide technical information relative to performing and documenting the implementation of the DTC method, including operational procedures, and indicate the current revision of each.	Y	DOE/WIPP-02-3124, Rev. 0D	All ANL-CCP documents were reviewed before, during, or directly following this inspection. The correct revisions for each are noted in Objective Evidence in the cell to the left in this row.	Y	Documents include: CCP-TP-504, Rev. 3; CCP-AK-ANEL-500, Rev. 1; CCP-AK-ANLE-501, Rev. 0; and 9 Calculation packages prepared by J. Vance & J. Holderness cited in Section 8.2.1.
Dose-To-Curie Instruments					
Verify the following: <ul style="list-style-type: none"> • Specifications for the instruments used for dose rate measurements of RH TRU waste containers are provided in ANL-CCP documents • Performance and measurement control criteria for dose rate instruments have been specified and integrated in ANL-CCP operating procedure(s) • The instruments used to make dose rate measurements of RH containers are identified • The instruments identified in previous bullet have been appropriately calibrated • The scale used to weigh the containers has been calibrated and that the scale has been checked each operational day 	Y	CCP-TP-504, Rev. 3, Section 4.1	These technical aspects were verified by examination during the inspection	Y	CCP-TP-504, Rev. 3; CCP-AK-ANLE-501, Rev. 0; ANL-CCP DTC Batch Data Report No. ANLRHDT06001 that contains copies of Attachment 1, <i>Measurement Control Report</i> , Attachment 2, <i>Container Data Sheet</i> , from CCP-TP-504 and Attachment 3, <i>Waste Container Dose-to-Curie Conversion Record</i> , from CCP-TP-504, Rev. 3, for each container in the BDR that was assayed.
Verify that the instruments used for dose rate measurements of RH TRU containers are properly calibrated to provide data that are consistent with those used in the calculation of the radionuclide-specific activity.	Y	CCP-TP-504, Rev. 3, Section 4.1	Calibration sheets for the ion chambers used were examined.	Y	ANL-CCP DTC Batch Data Report No. ANLRHDT06001

ATTACHMENT A.2: RH RADIOLOGICAL CHARACTERIZATION CHECKLIST: DOSE-TO-CURIE

EPA Inspection No.: EPA-ANL-CCP-RH-9.06-8

Inspection Date: September 12-14, 2006

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
Verify that the position of the detector relative to the waste container and any intervening shielding is consistent with that used in the calculation of the expected radiation dose.	Y	CCP-TP-504, Rev. 3, Section 4.1	Detector position relative to the waste container and shielding is addressed appropriately.	Y	ANL-CCP DTC Batch Data Report No. ANLRHDTC06001

ATTACHMENT A.2: RH RADIOLOGICAL CHARACTERIZATION CHECKLIST: DOSE-TO-CURIE (DTC)

EPA Inspection No.: EPA-ANL-CCP-RH-9.06-8

Inspection Date: September 12–14, 2006

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
General Technical Requirements					
DTC must provide information to support the reporting of 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	DOE/WIPP-02-3124, Rev. 0D, Attachment C, Section 8.0	Quantitative values and uncertainties for ²³⁸ Pu, ²³⁹ Pu, ²⁴⁰ Pu, ²⁴² Pu, ²⁴¹ Am, ²³³ U, ²³⁴ U, ²³⁸ U, ⁹⁰ Sr, and ¹³⁷ Cs are reported.	Y	ANL-CCP DTC Batch Data Report No. ANLRHDTC06001
Verify that a waste container is classified as RH TRU only if the dose equivalent rate at the exterior of the surface of the container is between 200 mrem/hr and 1000 rem/hr <u>and</u> the concentration of alpha emitting TRU radionuclides is greater than 100 nCi/g waste.	Y	DOE/WIPP-02-3124, Rev. 0D, Attachment C, Section 12.0	All containers in RH TRU waste stream AERHDM meet the criteria for TRU (concentration of alpha-emitting TRU radionuclides greater than 100 nCi/g waste) and RH (dose equivalent rate at the exterior of the surface of the container between 200 and 1000 rem/hr).	Y	ANL-CCP DTC Batch Data Report No. ANLRHDTC06001
Assess the technical adequacy of the calculations involving the application of scaling factors and/or correlation techniques.	Y	DOE/WIPP-02-3214, Rev. 0D, Attachment C, Section 7.0	The technical adequacy of the calculations involving the application of scaling factors and/or correlation techniques is addressed in Section 8.3.	Y	See Section 8.2 of this report, also INL-RH-02; INL-RH-03; ANEL-RH-03; ANLE-RH-05; ANLE-RH-06; ANLE-RH-07.
Measurements: Dose Rate and Background					
Verify the following: <ul style="list-style-type: none"> • Dose rates are measured four (4) times at a detector-to-container distance of 1 meter, with the container rotated 90° between each of the four measurements • The appropriate ion chamber and probe are used • The radiation field is measured at least two locations about the container at the mid-height of the container and a distance of 1 meter from the surface of the container. 	Y	DOE/WIPP-02-3214, Rev. 0D, Attachment C, Section 7.0	ANL-CCP Batch Data Report No. ANLRHDTC06001 examined for this inspection documented technically appropriate collection of container-specific dose rate information.	Y	ANL-CCP DTC Batch Data Report No. ANLRHDTC06001, copies of copies of Attachment 1, <i>Measurement Control Report</i> and Attachment 2, <i>Container Data Sheet</i> and Attachment 3, <i>Waste Container Dose-to-Curie Conversion Record</i> , from CCP-TP-504, Rev. 3.
Verify that the background rate is measured and recorded and that actions are taken to reduce the background if the measured	Y	CCP-TP-504, Rev. 3, Section 4.1	ANL-CCP Batch Data Report No. ANLRHDTC06001 examined for this inspection documented technically	Y	ANL-CCP DTC Batch Data Report No. ANLRHDTC06001, copies of Attachment 2,

ATTACHMENT A.2: RH RADIOLOGICAL CHARACTERIZATION CHECKLIST: DOSE-TO-CURIE (DTC)

EPA Inspection No.: EPA-ANL-CCP-RH-9.06-8

Inspection Date: September 12–14, 2006

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
background radiation levels are greater than one-tenth of the expected container rate.			appropriate background measurement data.		<i>Container Data Sheet</i> from CCP-TP-504, Rev. 3
Measurement Documentation					
Verify that container number, waste stream identifier, and all pertinent container-specific measurement data are entered into the “Waste Container Dose-to-Curie Conversion Record” spreadsheet, including: <ul style="list-style-type: none"> • Date of the gamma measurements • Waste Stream Designation • Container Number • Container Gross Weight • Estimated Can Size for Cans #1, #2, #3 • Estimated Fill Percentage for Cans #1, #2, #3 • Four (4) quadrant dose rates • Average of four (4) dose measurements • Expected container dose rate • Waste Material Type (matrix) 	Y	DOE/WIPP-02-3124, Rev. 0D; CCP-TP-504, Section 4.2	ANL-CCP Batch Data Report No. ANLRHDTC06001 examined for this inspection contained all required documentation.	Y	ANL-CCP DTC Batch Data Report No. ANLRHDTC06001, copies of Attachment 2, <i>Container Data Sheet</i> and Attachment 3, <i>Waste Container Dose-to-Curie Conversion Record</i> , from CCP-TP-504, Rev. 3.
Verify that DTC BDR ANLRHDTC06001 contains the following items: <ul style="list-style-type: none"> • Batch Data Report Cover Sheet, Attachment 4 • Batch Data Report Table of Contents, Attachment 5 • Batch Data Report Narrative Summary, Attachment 6 • ITR Review Checklist, Attachment 7 • Measurement Control Report, Attachment 1 • Container Data Sheet(s), Attachment 2 • Waste Container Dose-to-Curie Conversion Record(s), Attachment 3 • Copy of NCRs, if applicable 	Y	CCP-TP-504, Rev. 3, Section 4.3	ANL-CCP DTC Batch Data Report No. ANLRHDTC06001 examined for this inspection contained all required elements.	Y	ANL-CCP DTC Batch Data Report No. ANLRHDTC06001

ATTACHMENT A.2: RH RADIOLOGICAL CHARACTERIZATION CHECKLIST: DOSE-TO-CURIE (DTC)

EPA Inspection No.: EPA-ANL-CCP-RH-9.06-8

Inspection Date: September 12-14, 2006

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
<ul style="list-style-type: none"> Evidence of a review by an ITR and SPM, as appropriate. 					
<p>Verify that records generated in support of DTC are available for inspection. Records include the following, at a minimum:</p> <ul style="list-style-type: none"> Site-specific procedures developed to implement the DTC method Technical basis for the determination of the waste stream's "Standard Mix" shielding calculations for waste containers Technical basis for determination of radionuclide scaling factors TMU technical support documents 	Y	DOE/WIPP-02-3214, Rev. 0D, Attachment C, Section 15.0	All records related to DTC were available for this inspection on-site at INL and in CBFO Headquarters in Carlsbad, New Mexico.	Y	ANL-CCP DTC Batch Data Report No. ANLRHDTC06001

ATTACHMENT A.2: RH RADIOLOGICAL CHARACTERIZATION CHECKLIST: DOSE-TO-CURIE (DTC)

EPA Inspection No.: EPA-ANL-CCP-RH-9.06-8

Inspection Date: September 12–14, 2006

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
Technical Basis					
Verify the following: <ul style="list-style-type: none"> • Results of sampling and calculation form the basis for the development of radionuclide scaling factors used to convert measured dose rates to radionuclide-specific activities • Dose rates are measured at a distance of one meter from the outer surface of the waste container at the mid-height of the container • Calculations appropriately present the relationship between a container's measured dose rate and the waste's activity • Calculations account for all relevant container properties, specifically fill height (apparent density), waste type (matrix) and attenuation (shielding) of the container and/or liner wall • Calculations are performed using technically appropriate shielding analysis techniques 	Y	DOE/WIPP-02-3214, Rev. 0D, Attachment C, Section 7.0; CCP-AK-INL-501, Rev. 0; CCP-TP-504, Rev. 3, Section 4.3	These technical aspects were examined before, during, and following this inspection in consultation with CTAC technical personnel.	Y	CCP-AK-ANLE-501, Rev. 0; INL-RH-02; INL-RH-03; ANEL-RH-03; ANLE-RH-04; ANLE-RH-05; ANLE-RH-06; ANLE-RH-07; INL-RH-09; INL-RH-10; INL-RH-12
Verify that waste containers contain only matrices for which the DTC methodology has been established. Verify that the type of waste (waste matrix) in each container is recorded along with the height of the waste in the container.	Y	DOE/WIPP-02-3214, Rev. 0D, Attachment C, Section 5.0	RH waste cans contain metals (steel), concrete, or organics with a minimum of mixing of dissimilar types of materials. Fill heights are specified for all containers, i.e., less than 25% full, 25% to 66% full, 66% to 90% full, more than 90% full.	Y	ANL-CCP DTC Batch Data Report No. ANLRHDTC06001; DTC spreadsheets in BDR
Verify that all DTC-related calculations have been subjected to a technical review and that all technical review comments and their resolutions are documented.	Y	DOE/WIPP-02-3214, Rev. 0D, Attachment C, Section 14.0	With minor exceptions, all calculation packages contain evidence of a technical review.	Y	Examination of the 9 calculation packages that supported the development of radionuclide scaling factors prepared by J. Vance & J. Holderness; see

ATTACHMENT A.2: RH RADIOLOGICAL CHARACTERIZATION CHECKLIST: DOSE-TO-CURIE (DTC)

EPA Inspection No.: EPA-ANL-CCP-RH-9.06-8

Inspection Date: September 12–14, 2006

Required Technical Elements	Y/N	Location	Verification of Activity	Y/N	Objective Evidence
					Section 8.2.1
Verify that the ratio of actual measured dose rate to the calculated dose rate is used to calculate a scaling factor that is applied to the “Standard Mix” or subset thereof, that was used to estimate individual radionuclide activities.	Y	DOE/WIPP-02-3214, Rev. 0D, Attachment C, Section 11.0; CCP-TP-504, Rev. 3, Section 4.2	The “Standard Mix” was not used to generate scaling factors for this waste stream. The technical documentation of the scaling factor development supports the use of dose rate measurements.	Y	CCP-AK-ANLE-501, Rev. 0; INL-RH-02; INL-RH-03; ANEL-RH-03; ANLE-RH-04; ANLE-RH-05; ANLE-RH-06; ANLE-RH-07
Total Measurement Uncertainty (TMU)					
Verify that a method for estimating total measurement uncertainty (TMU) has been developed and documented for RH TRU waste stream AERHDM.	Y	DOE/WIPP-02-3214, Rev. 0D, Attachment C, Section 13.0	This checklist addresses the aspects of TMU attributable to DTC. The aspects of TMU related to the development and application of radionuclide scaling factors are addressed in Section 8.3.	Y	CCP-AK-ANLE-501, Rev. 0; INL-RH-02; INL-RH-03; ANEL-RH-03; ANLE-RH-04; ANLE-RH-05; ANLE-RH-06; ANLE-RH-07
TMU is based upon the propagation of uncertainties present in all aspects of radiological characterization, including DTC.	Y	DOE/WIPP-02-3214, Rev. 0D, Attachment C, Section 13.0	TMU includes the contributions of all applicable aspects of the DTC process.	Y	CCP-AK-ANLE-501, Rev. 0; INL-RH-02; ANLE-RH-05; ANLE-RH-06
Verify that the approach for TMU determination incorporates the contributions of all applicable components of DTC, including: <ul style="list-style-type: none"> • Measured sample isotopic activities • Relative uncertainties associated with each measured radionuclide • Measurement of the container’s dose rate • Determination of waste mass • Modeling errors or biases. 	Y	DOE/WIPP-02-3214, Rev. 0D, Attachment C, Section 13.0	TMU includes the contributions of all applicable aspects of the DTC process.	Y	CCP-AK-ANLE-501, Rev. 0; INL-RH-02; INL-RH-03; ANEL-RH-03; ANLE-RH-04; ANLE-RH-05; ANLE-RH-06; ANLE-RH-07
Verify that the TMU approach has been formally submitted to CBFO for review and approval.	Y	DOE/WIPP-02-3214, Rev. 0D, Attachment C, Section 13.0	The TMU approach was evaluated by the CTAC Technical Specialists (D. Stuenkel and J. Oliver) during this inspection.	Y	INL-RH-02; INL-RH-03; ANEL-RH-03; ANLE-RH-04; ANLE-RH-05; ANLE-RH-06; ANLE-RH-07

ATTACHMENT A.3: VISUAL EXAMINATION (VE) CHECKLIST

EPA Inspection No.: EPA-ANL-CCP-RH-9.06-8

Inspection Date: September 12-14, 2006

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
<p>RHVE-1</p> <p>Site procedures identify required training and qualifications for RHVE personnel.</p>	<p>WCPIP, Rev. 0D, Section 4.1.2.2</p> <p>CCP-QP-002, Rev. 21</p>	<ul style="list-style-type: none"> • Formal training elements include: project requirements, container identification and labeling, applicable state and federal regulations. • Site-specific training program: OJT, identification of summary category groups, WMPs, packaging configurations, residual liquids. 	Y	<p>During the on-site inspection, EPA interviewed two (2) of the three (3) qualified operators and the designated SME/VEE. The operators had received training on AK Summary CCP-AK-ANLE-500 for the waste stream being examined AERHDM. This is a S5000 debris waste stream. Operators were also required to read the WCPIP, which includes EPA regulations and requirements. The VEE for ANL is also the VEE for INL and spends his time between the two sites. The VEE is also the OJT/SME and provided the OJT for the operators. The operators passed the required written test on May 22, 2006. The operators reviewed revision 1 of the AK Summary on August 14, 2006.</p> <p><u>Objective evidence:</u></p> <ol style="list-style-type: none"> 1. Qualification cards for VE operators 2. Qualification Card for SME/VEE 3. VEE appointment letter, dated April 17, 2006 4. List of Qualified Individuals (LOQI) for ANLE RH VE program 5. Attendance Sheets for CCP-AK-ANLE-500 training 6. Acceptable Knowledge Summary Report Training Certificates for Argonne Remote-Handled Debris Waste Stream – AERHDM.
<p>RHVE-2</p> <p>Operator qualification and re-qualification requirements are described.</p>	<p>WCPIP, Rev. 0D, Section 4.1.2.2</p> <p>CCP-QP-002, Rev. 21, Section 4.2.5</p>	<ul style="list-style-type: none"> • To become qualified, the RHVE operator must pass a comprehensive written test based on training objectives with a minimum score of 80% • Demonstrate capability in the presence of the site VEE during OJT • RHVE operators re-qualified every 2 years based on continued satisfactory performance 	Y	<p>EPA reviewed the Qualification Cards for the three (3) qualified operators and the designated VEE. The VEE is the OJT/SME and provided the OJT for the operators. The operators passed the required written test on May 22, 2006. The Qualification Cards reviewed were completed as required. As this program is new, the re-qualification of operators has not been required.</p> <p><u>Objective evidence:</u></p> <ol style="list-style-type: none"> 1. Qualification cards for VE operators

ATTACHMENT A.3: VISUAL EXAMINATION (VE) CHECKLIST

EPA Inspection No.: EPA-ANL-CCP-RH-9.06-8

Inspection Date: September 12-14, 2006

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
		<ul style="list-style-type: none"> Unsatisfactory performance – failed to identify prohibited item during OJT with score of less than 80% on exam 		<ol style="list-style-type: none"> Qualification Card for SME/VEE VEE appointment letter, dated April 17, 2006 List of Qualified Individuals (LOQI) for ANLE RH VE program
<p>RHVE-3</p> <p>Each site has a designated VE expert (VEE)</p>	<p>WCPIP, Rev. 0D, Section 4.1.2.2</p> <p>CCP-PO-001, Rev. 12</p>	<ul style="list-style-type: none"> VEE designation is documented VEE has knowledge of the RH TRU waste being characterized Responsible for overall direction and implementation of VE at the facility Certification Plan specifies the selection, qualification, and training requirements of VEE 	Y	<p>VEE training and designation were reviewed during the on-site inspection. The VEE was designated as such in a letter from the SPM, dated April 17, 2006. Although the VEE has overall responsibility for the VE process, the VEE and operators are not necessarily at the same location when container audio/visual recordings are processed. The VEE and the operators have copies of the VE recordings so that problems encountered by the operators can be discussed, reviewed, and resolved with the VEE by electronic or telephonic communication.</p> <p><u>Objective evidence:</u></p> <ol style="list-style-type: none"> Qualification Card for VEE List of Qualified Individuals (LOQI)
<p>RHVE-4</p>	<p>CCP-TP-509, Rev. 0, Section 4.4</p>	<ul style="list-style-type: none"> Operators review AK Tracking Spreadsheet to verify that correct containers examined Rejected containers are placed in a shielded container with a CCP Hold Tag attached Provide container processing information to SPM/VPM 	Y	<p>Prior to commencing VE operations, the operators review the AK Tracking Spreadsheet to determine which containers will be examined. During the on-site inspection, EPA inspected the hold tags applied to the shielded containers, located in 331 yard, Building 331 Dome, and 398 yard, for the rejected containers from BDR RHANLVE060001. A hold tag was correctly attached to each container. The processing information for each BDR is contained within the WTS system and identifies the container number and the NCR number for rejected containers.</p> <p>The operators populate an Excel spreadsheet, “DGL Container Management”, with the VE data. Only completed BDRs are uploaded to the spreadsheet. The spreadsheet is accessed by the SPM to obtain the container information.</p>

ATTACHMENT A.3: VISUAL EXAMINATION (VE) CHECKLIST

EPA Inspection No.: EPA-ANL-CCP-RH-9.06-8

Inspection Date: September 12-14, 2006

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				<p><u>Objective evidence:</u></p> <ol style="list-style-type: none"> 1. AK tracking spreadsheet for containers in waste stream AERHDM 2. BDR # RHANLVE060001 3. Processing information for BDR RHANLVE060001
<p>RHVE-5</p> <p>Procedures and technical guidance documents provide complete instructions for performing RHVE.</p>	<p>WCPIP, Rev. 0D, Sections 4.1.2, 4.1.2.1, 4.3.3</p> <p>CCP-TP-500, Rev. 2, Sections 4.1-4.2, Attachment 1</p>	<p>Procedures are sufficiently detailed to enable the operator to determine if a waste container meets the criteria of '194.24 with regard to identifying applicable parameters with waste limits [194.24, c, (4)] – demonstrate 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 (c) of this section).</p> <ul style="list-style-type: none"> • All existing VE tapes will be reviewed and the VE data will be documented • Existing waste container packaging records will be qualified by VE or RTR • 100% of containers will be subject to VE at the time of packaging • Waste stream description and WMC verified • Presence/absence of prohibited items 	Y	<p>In this waste stream, 44 containers were already packaged and CCP has audio/visual tapes for all of these. CCP estimates that there will be an additional 50 ± 100 drums that still need to be packaged. Packaging will take place in 7.5-gallon cans and two cans will be placed in each 30-gallon container.</p> <p>Two (2) operators generated VE data for RH containers from review of audio/visual recordings. The operators reviewed existing recordings and completed the required data sheets from their observations. Operators were given training on the waste stream prior to processing containers.</p> <p>CCP had generated only one (1) Batch Data Report (BDR) that had been through project-level review at the time of the inspection. Of the ten (10) containers in BDR RHANLVE060001, four were rejected and six (6) met the required VE QAOs.</p> <p>At the end of the VE event, the operators assigned percentages to each WMP and manually calculated, from these percentages and the weight of the waste contained in the cans, the weight of each WMP. Operators did not retain any of the manual calculations performed. The ITR did not perform the required check of these manual calculations and the requirement to perform this verification was not included in the ITR checklist. When interviewed, an operator could not provide the basis for answering at least one of the data form questions. EPA generated concern ANL-CCP-RH-VE-06-001CR to address these issues.</p>

ATTACHMENT A.3: VISUAL EXAMINATION (VE) CHECKLIST

EPA Inspection No.: EPA-ANL-CCP-RH-9.06-8

Inspection Date: September 12-14, 2006

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				<p><u>ANL-CCP-RH-VE-06-001CR:</u></p> <ol style="list-style-type: none"> 1. Method of manual calculation of WMP weights is not contained within the existing procedure. Failure to document this process in the procedure may lead to inconsistent and undocumented methodologies being used for this calculation. Resolution: CCP will remove the requirement to estimate WMP weights from procedure CCP-TP-500, as it is not required by the WCPPIP. 2. ITR is required to review all manual calculations but WMP weight calculations are not reviewed, nor is the need to review the item contained in any ITR checklist. Failure to do so removes the only required check on the calculation on which WMP quantities are based. Resolution: When procedure CCP-TP-500 is revised, WMP weights will not be calculated and therefore will not require verification of the calculation. 3. Operators are filling out some "Visual Examination Data Form" items without the knowledge necessary to make the correct decision. Example: Checking off yes for "The waste is consistent with the waste stream description?" When questioned, a VE operator could not explain how they were able to answer this question. Confirmation of waste stream description is essential to AK confirmation required by 40 CFR 194.24(c). Operator is responsible to decide if the drum examined is part of the waste stream. Resolution: CCP will provide additional training for the operators. <p>EPA considers this concern closed.</p> <p>RH drums are stored in shielded containers and, if a container is rejected, CCP/ANL personnel place a hold tag on that outer container. The hold tags on all of the rejected containers in BDR # RHANLVE060001 were inspected by EPA.</p>

ATTACHMENT A.3: VISUAL EXAMINATION (VE) CHECKLIST

EPA Inspection No.: EPA-ANL-CCP-RH-9.06-8

Inspection Date: September 12-14, 2006

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
				<p>EPA reviewed the data sheets and audio/video recordings for containers 00816, 00826, 00825, and 00815 to ensure consistency between the written and visual records. EPA did not identify any discrepant information for these containers. The audio/video recordings do not show the 7.5-gallon cans being loaded into the 30-gallon containers but the cans and containers can be associated through the original packaging information. This information is included in the BDR for each container.</p> <p><u>Objective evidence:</u></p> <ol style="list-style-type: none"> 1. BDR # RHANLVE060001 2. List of Qualified Individuals (LOQI) for ANLE RH VE program 3. Attendance Sheets for CCP-AK-ANLE-500 training 4. Acceptable Knowledge Summary Report Training Certificates for Argonne Remote-Handled Debris Waste Stream – AERHDM.
RHVE-6	CCP-TP-500, Rev. 2, Section 2.4.2	<ul style="list-style-type: none"> • Corrective actions are taken when necessary 	Y	<p>NCRs were written as needed during processing of the containers in batch RHANLVE060001. Containers 00831 and 00816 were rejected because CCP operators could not verify that containers were free of liquids. CCP NCR-RHANL-0001-06 was issued by CCP to document this condition. NCR NCR-RHANL-0002-06 was generated for containers 00825 and 00829 because the operators were unable to determine the primary contents of the containers. All of the above containers were rejected by CCP.</p> <p><u>Objective evidence:</u></p> <ol style="list-style-type: none"> 1. BDR # RHANLVE060001
RHVE-7 Site procedure(s) require	WCPIP, Rev. 0D, Section	<ul style="list-style-type: none"> • ITR review Attachment 2 	Y	<p>The VEE signed off on the BDR RHANLVE060001 although the container inventories were incomplete. This was</p>

ATTACHMENT A.3: VISUAL EXAMINATION (VE) CHECKLIST

EPA Inspection No.: EPA-ANL-CCP-RH-9.06-8

Inspection Date: September 12-14, 2006

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
data generation and project level reviews of Batch Data Reports (BDRs).	4.1.2.1 CCP-TP-500, Rev. 1, ITR: Sections 4.3.5-4.3.8, Attachment 2, SPM: Section 4.4, Attachment 3	<ul style="list-style-type: none"> SPM review Attachment 3 		<p>identified by CCP and the inventories were revised prior to the on-site inspection. As the sign-off date for the BDR was after the additional training provided by CCP on June 15, 2006 EPA generated concern ANL-CCP-RH-VE-06-002C to address this issue.</p> <p><u>ANL-CCP-RH-VE-06-002C:</u> The ITR had not fully implemented the requirement for complete inventory put in place on June 15, 2006 at the time BDR #RHANLVE060001 was signed off on July 19, 2006. The ITR signed off on the checklist on July 19, 2006, however, it was then corrected to reflect the “complete inventory” requirement on August 25, 2006.</p> <p>Resolution: The ITR initiated the change after he fully understood the expected criteria of “complete inventory” based on the issue at INL. At the time of the inspection the VE data had been revised to include a complete inventory of the waste items in each container. EPA considers this concern closed.</p> <p>The SPM checklist listed the containers that were rejected in the batch and also provided the applicable NCR numbers.</p> <p><u>Objective evidence:</u></p> <p>1. BDR # RHANLVE060001</p>
RHVE- 8	CCP-TP-500, Rev. 2, Section 5.0	<ul style="list-style-type: none"> Lifetime/QA records – Attachments 1-5, Copy of NCRs QA/nonpermanent records – VHS tape or DVD (primary and backup) 	Y	<p>Both the BDR and audio/visual recordings for RHANLVE060001 were available for review during the on-site inspection. Two copies of the original VHS recordings are made, one being sent to the VEE and one to the operators for processing.</p> <p><u>Objective evidence:</u></p> <p>1. BDR # RHANLVE060001</p> <p>2. Audio/visual recordings for container in BDR # RHANLVE060001</p>

ATTACHMENT A.3: VISUAL EXAMINATION (VE) CHECKLIST

EPA Inspection No.: EPA-ANL-CCP-RH-9.06-8

Inspection Date: September 12-14, 2006

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
<p>RHVE-9</p> <p>Quality Assurance Objectives are defined and met</p>	<p>WCPIP, Rev. 0D, Section 4.1.2.3</p>	<p>Data Accuracy:</p> <p><u>194.22, b, (1)</u> the degree to which data agree with an acceptable reference or true value</p> <p><u>WCPIP:</u> maintained by requiring operators to pass a comprehensive test with a score of 80% and demonstrate satisfactory performance for initial qualification and re-qualification</p> <p>Data Precision:</p> <p><u>194.22, b, (2)</u> a measure of the mutual agreement between comparable data gathered or developed under similar conditions, expressed in terms of a standard deviation</p> <p><u>WCPIP:</u> – maintained by reconciling any discrepancies between 2 operators (or operator and ITR) with regard to physical form of waste, absence of residual liquid</p> <p>Data Representativeness:</p> <p><u>194.22, b, (3)</u> the degree to which data accurately and precisely represent a characteristic of a population, a parameter, variations at a sampling point, or environmental conditions</p> <p><u>WCPIP:</u> – Contents placed in a container will be described on the data forms</p> <p>Data Completeness:</p> <p><u>194.22, b, (4)</u> a measure of the amount of valid data obtained compared to the amount that was expected</p> <p><u>WCPIP:</u> – Relevant waste information must be collected and documented on a videotape</p>	<p>Y</p>	<p>Data Accuracy:</p> <p>This QAO was met by using qualified operators and VEE to generate and review the VE data generated.</p> <p>Data Precision:</p> <p>This QAO was met by the two operators accepting and signing the data sheets. CCP has never encountered a situation where the two operators could not resolve an initial difference in what data should be recorded. The VEE, who is also the ITR, discusses and resolves any VE data discrepancies with the operators.</p> <p>Data Representativeness:</p> <p>To ensure that the Data Representativeness QAO was met, the VEE reviewed the visual recording and the data sheet for each container in the batch that did not have an NCR associated with it. The SPM checked WMP weights against the item descriptions to ensure that this QAO was met.</p> <p>Data Completeness:</p> <p>The VEE determined that the Data Completeness QAO was met by reviewing the data sheets to ensure that some information is present in each block.</p> <p>Data Comparability:</p> <p>Data Comparability QAO was met by the use of an approved training procedure (CCP-QP-002) and ensuring that operators and VEE were fully qualified. This training and qualification was documented in the VEE and operator Qualification Cards.</p>

ATTACHMENT A.3: VISUAL EXAMINATION (VE) CHECKLIST

EPA Inspection No.: EPA-ANL-CCP-RH-9.06-8

Inspection Date: September 12-14, 2006

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
		<p>and/or data form or other unalterable media</p> <p>Data Comparability:</p> <p><u>194.22. b. (5)</u> a measure of the confidence with which one data set can be compared to another</p> <p><u>WCPIP</u>: – ensured by site meeting training requirements and complying with the minimum standards used to implement VE</p>		
<p>RHVE-10</p> <p>VE as a method to qualify AK data</p>	<p>WCPIP, Rev. 0D, Sections 4.3, 4.3.3</p>	<p>194.24, c, (4) – demonstrate 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 (c) of this section.</p> <p>If VE is used as a qualification method for AK all of the requirements in section 4.3 and 4.3.3 are met:</p> <ul style="list-style-type: none"> • Quality and reliability of the measurement control program under which the data were generated (QC samples included in the VE process) • Extent to which the data demonstrate the properties of interest (VE process generates data for <u>all</u> items in containers) • Qualification of personnel generating data (training records for personnel on tapes performing the original VE event) • Technical adequacy of the procedures used to generate the original data (copies 	Y	<ul style="list-style-type: none"> • CCP uses two (2) qualified operators and an approved procedure to generate VE data. • The data sheets in BDR # RHANLVE060001 were revised approximately two (2) months after the original VE examinations. This revision was due to the original container inventories being incomplete. The BDR reviewed by EPA at the time of the on-site inspection contained complete container inventories as required. • The two operators that generated the only completed BDR (RHINLVE60001) at the time of the on-site inspection were qualified and had passed the required examination when they generated the VE data. Training records for the three (3) operators and the VEE were complete and available for review. • Procedure CCP-TP-500, Rev. 2 contains instructions for performing VE by review of original audio/visual recordings. The procedure was technically adequate.

ATTACHMENT A.3: VISUAL EXAMINATION (VE) CHECKLIST

EPA Inspection No.: EPA-ANL-CCP-RH-9.06-8

Inspection Date: September 12-14, 2006

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
		of original procedures)		
RHVE-11	CCP-AK-ANLE-502, Rev. 0, Section 3.2	Verify from the packaging records which smaller cans were placed into any particular container.	Y	Packaging records are included in the BDR for each container. <u>Objective evidence:</u> 1. BDR # RHANLVE060001
RHVE-12	WCPIP, Rev. 0D, Section 2.2.3.2	DQO for Physical Form – “Generator sites must determine the uncertainty in the estimate of the weight of the waste.”	Y	CCP SPM stated that this will be done when container information is entered into WWIS. At this time the RH WWIS modules are not complete and WWIS was not included in the scope of this inspection. All WMPs for debris waste will be entered into WWIS as plastic as required by the WCPIP.

Attachments B.1 through B.3

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

Attachment B.1 EPA Inspection Issue Tracking Form, EPA Issue No. ANL-CCP-RH-VE-06-001CR

Inspection No. EPA-ANL-CCP-RH 9.06-8	Issue Number: ANL-CCP-RH-VE-06-001CR, Rev. 1 Date: 9-13-06
Inspector: Dorothy E. Gill	Sample Size: All Available BDRs
Attachments? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	Population size (if known): One (1)
A. Description of Issue: 1. Method of manual calculation for WMP weights is not contained within the existing procedure. Failure to document this process in the procedure may lead to inconsistent and undocumented methodologies being used for this calculation. CCP Response: CCP will initiate the process to remove this requirement in the procedure to determine the WMP weights. The requirement in the procedure is not required by the PIP or the WAP. 2. ITR is required to review all manual calculations but WMP weight calculations are not reviewed nor is the need to review the item contained in any ITR checklist. Failure to do so removes the only required check on the calculation on which WMPs quantities are based. CCP Response: Based on resolution to comment 1, the ITR will no longer have manual calculations to review so the resolution to comment 1 also resolves comment 2. 3. Operators are filling out some “Visual Examination Data Form” items without the knowledge necessary to make a correct decision. Example: Checking off <i>yes</i> for “The waste is consistent with the waste stream description?” When questioned, a VE operator could not explain how they were able to answer this question. Confirmation of waste stream description is essential to AK confirmation as required by 40 CFR194.24 (c). Operator is responsible to decide if the drum examined is part of the waste stream. CCP Response: The VE operators were comparing the items listed in Table 2 of Section 5.4.1 of the AK Summary Report (posted in VE work area) to the items seen on the video. This table is more detailed than Section 2.0, Waste Stream Description and, therefore, the operators were adequately verifying that the waste items were consistent with the waste stream description. However, when the operators were asked the question with respect to the text description given in Section 2.0, they did not give a crisp clear explanation. Based on the comment, CCP will provide additional training to the operators.	
B. Regulatory Reference: 40 CFR 194.24 (c)	

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

Attachment B.1 EPA Inspection Issue Tracking Form, EPA Issue No. ANL-CCP-RH-VE-06-001CR

Inspection No. EPA-ANL-CCP-RH 9.06-8	Issue Number: ANL-CCP-RH-VE-06-001CR, Rev. 1 Date: 9-13-06
C. Site requirement(s): 1. CCP-TP-500, Revision 2, 4.1.2 [F] 2. DOE/WIPP-02-3214, WCPIP, Revision 0D, Section 3.5.1.2 3. CCP-TP-500, Revision 2, Section 4.1.2 [H.4]	
D. Discussed with: Site Personnel: Irene Quintana, Tommy Mojica DOE/CTAC Personnel: Wayne Ledford, Karen Gaydosh Other Personnel: Eric D'Amico, Larry Porter	
E. Additional Comments: Before implementing this procedure at other CCP sites, the impact of this concern should be evaluated for inadequacies.	
F. Site Response Information: Site Response Required? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO Site Response Due Date: October 5, 2006	

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

Attachment B.2 EPA Inspection Issue Tracking Form, EPA Issue No. ANL-CCP-RH-VE-06-002C

Inspection No. EPA-ANL-CCP-RH 9.06-8	Issue Number: ANL-CCP-RH-VE-06-002C Date: 09-13-06
Inspector: Dorothy Gill	Sample Size: All BDRs
Attachments? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	Population size (if known): One (1)
A. Description of Issue: The ITR had not fully implemented the requirement for complete inventory put in place on June 16, 2006 at the time BDR #RHANLVE060001 was signed off on July 19, 2006. The ITR signed off on the checklist on July 19, 2006, however, it was then corrected to reflect the “complete inventory” requirement on August 25, 2006. CCP Response: The ITR initiated the change after he fully understood the expected criteria of “complete inventory” based on the issue at INL.	
B. Regulatory Reference: 40 CFR 194.24 (c)	
C. Site requirement(s): DOE/WIPP-02-3214, WCPIP, Revision 0D, Section 4.1.2.1	
D. Discussed with: Site Personnel: Irene Quintana, Tommy Mojica DOE/CTAC Personnel: Wayne Ledford, Karen Gaydosh Other Personnel: Eric D’Amico, Larry Porter	
E. Additional Comments:	
F. Site Response Information: Site Response Required? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO Site Response Due Date: N/A	

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

Attachment B.3 EPA Inspection Issue Tracking Form, EPA Issue No. ANL-CCP-RH-AK-06-003C

Inspection No. EPA-ANL-CCP-RH 9.06-8	Issue Number: ANL-CCP-RH-AK-06-003C Date: 09-13-06
Inspector: Connie Walker	Sample Size:
Attachments? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	Population size (if known): 1 AK Accuracy Report
A. Description of Issue: Section 4.1.1.2 of the WCPIP states that: The percentage of waste containers which require reassignment to a new SCG and new waste stream will be reported as a measure of AK Accuracy. The AK Accuracy Report dated August 28, 2006, reports SCG accuracy, but not waste stream accuracy. CCP Response: CCP will be to ensure that “or new waste stream” is included in AK Accuracy Report to comply with Section 4.1.1.2.	
B. Regulatory Reference: 40 CFR 194.24 (c) (3)	
C. Site requirement(s): DOE/WIPP-02-3214, WCPIP, Revision 0D, Section 4.1.1.2	
D. Discussed with: Steve Schafer, Kevin Peters Eric D’Amico, A.J. Fisher	
E. Additional Comments: It is noted that the AK Accuracy Report will be among those documents requiring revision when the latest revision of the WCPIP is approved. Revision of the AK Accuracy Report to address the above requirements may be done at that time, when other revisions are being done (e.g. addition of the EPA 10 radionuclide identification as a DQO).	
F. Site Response Information: Site Response Required? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO Site Response Due Date: N/A	

Attachment C

EPA's Response to Public Comments

EPA's Response to Public Comments

EPA received one set of public comments from DOE's Carlsbad Area Field Office (CBFO) in response to the November 8, 2006, *Federal Register* notice that proposed EPA's decision to approve various components of the RH TRU waste characterization program implemented by CCP at ANL and INL (71 FR 65488, November 8, 2006).

All comments are reproduced here along with EPA's response to each comment. Both ANL and INL Baseline Inspection Reports have been revised to reflect EPA's response, where appropriate.

Comment No. 1: On page 65490 of the Federal Register (FR) Notice in the 3rd column it references "EPA INL CCP RH Inspection Report A-98-42, II-A4-69" and the correct reference is A-98-49. In addition, on page 65492 of the same notice in the 1st column the reference should be to A-98-49, as well, instead of A-98-42.

***Response:** The comment applies to the FR notice. We concur with the comment, however, the error does not affect the sufficiency of the public's notice of the proposed approval nor does it affect the final approval itself.*

Comment No. 2: EPA is using the Tier I and Tier II change notice process to collect additional information regarding a site's waste characterization program. See Comments 9 and 10 below. The Tier change process is designed to notify the EPA of changes or expansions to programs subsequent to a Baseline Compliance Decision, not to generate additional information. The authority provided to the Agency under 40 CFR Part 194.8(b)(4) is for the expressed purpose of reporting changes to the Agency. For requests for additional information, the Agency is encouraged to implement the provisions of 40 CFR 194.4(b)(2).

***Response:** By requiring INL-CCP and ANL-CCP to notify EPA of the availability of new or additional information generated following the EPA's baseline inspection and the approval decision as part of the Tier 2(T2) change notice process, EPA will remain informed of improvements in the approved waste characterization processes (e.g., AK and DTC) in a timely manner. Through this process, EPA will verify that CCP has updated/substantiated information that was EPA evaluated during the baseline and follow-up inspections.*

EPA's baseline inspection approvals are not contingent on review of any additional information. EPA agrees that T2 reports are intended to report changes to approved waste characterization programs. Also, T2 change reports are not the appropriate mechanism to generate new information that would assist in evaluating continuing compliance. As described in EPA's final modification to 194.8(b) (69 FR 42571, July 16, 2004), EPA uses its authority under §194.24(h), when it is necessary, to generate new or additional information to ensure continued compliance with EPA regulations. When reporting T2 changes reflecting updates or addition of new information to the material inspected during the baseline inspections, EPA expects the RH site to provide a brief

description of additions/updates to various AK and DTC documents. EPA can then decide whether review of this additional information under the authority of §194.24(h) is warranted for evaluating adequacy and continued compliance with regulatory requirements. EPA then will request such information. EPA have made appropriate modifications to the INL and ANL final baseline inspection reports to clarify our intent.

Comment No. 3: DOE is unclear as to the reasoning that the addition of a new piece of RTR equipment is considered a Tier I change by EPA for RTR of RH. However, as evidenced, for example, by the EPA approval of the INL-CCP CH Baseline, the addition of new RTR equipment would be a Tier II change. DOE requests that EPA explain this inconsistency.

Response: *EPA identified the use of new RTR equipment for RH waste as a Tier I change because we did not evaluate **any** RTR equipment during the baseline inspection of June 2006 at INL. Since EPA has no information of how RTR would be applied to RH waste to characterize physical waste contents and the absence of prohibited items in the retrievably-stored RH containers, EPA identified RTR equipment and its use for RH waste as a T1 change. Under the CH program, EPA identified a new RTR process at an approved site as a T2 change because we had evaluated the CH RTR process during baseline inspections at all CH sites.*

Comment No. 4: There are a number of inaccuracies in the Inspection Report A-98-49, II-A4-69 for EPA Baseline Inspection No. EPA-INL-CCP-RH-6.06-8. Some examples follow:

- a. Page 63, Section 8.3 in fifth bullet under Documents Reviewed identifies 19 containers in VE Batch Data Report (BDR) RHINLVE60001, 17 of which were subject to a CCP Non Conformance Report (NCR). Actually, at the time of the inspection, 5 of the 19 containers were rejected by an NCR.
- b. Page 8, Section 6.2, Table 3 identifies personnel that were not at the inspection. For example, James Mobley (as a VEE), Buddy Fussell (as VE/VET) and Marcus Steade (as VE/VET) did not participate in the inspection.

Response: *EPA concurs with the comment. We have revised report text accordingly. The revision described in (a), above increases the number of acceptable RH containers to 19 and not the number of containers stated in the proposed for approval in November 2006. (For additional discussion, see EPA's response to Comment Nos. 8 and 12, below.)*

Comment No. 5: On page 2 of the EPA-INL-CCP-RH-6.06-8 Inspection Report, the EPA limits their approval of processes (AK, DTC, and VE) based upon waste streams reviewed during the inspection. The CBFO agrees that the EPA has the authority to limit their approvals to specific waste streams at a particular site; however, it is important to note that these characterization processes do not change between waste streams.

As written, it is confusing as to which characterization processes are approved. The CBFO recommends that the EPA remove any waste stream specific approvals from process approvals and add an item 4 specifically detailing which waste streams are approved, as follows:

(4) Waste Stream No. ID-ANLLE-S5000 is approved for shipment. Any waste stream not approved under this approval must undergo a T1.

The removal of waste stream approvals from process approvals should be done throughout the text, including Table 1 and Table 14 of Baseline Inspection Report No. EPA-INL-CCP-RH-6.06-8.

Response: *Waste characterization processes may change depending on the complexity of different waste streams. Therefore, until the RH sites generate and apply detailed procedures for the derivation/generation of scaling factors and other critical radiological characterization inputs from the analytical data and AK records, EPA must restrict its approval to waste streams that have demonstrated compliance during the baseline inspection and cannot approve entire waste categories as is typically done under the CH program. EPA expects scaling factors will vary by waste stream and the RH sites need a consistent way to generate them. Therefore, we believe it is premature for EPA to approve the DTC process until the RH sites develop procedure(s) for calculating scaling factors.*

EPA did not approve CH TRU Summary Waste Categories at the beginning of the CH program. When approving the site-specific CH TRU waste characterization programs initially, EPA approval was also limited to specific waste streams. The reason for a limited approval was that both characterization activities at the waste generator sites and EPA's inspection process were in their infancy. As knowledge was gained and the sites' CH waste characterization program matured, EPA was able to approve summary waste categories. EPA expects that as RH waste characterization programs mature and gain confidence in the sites' ability to implement the RH WCPIP and comply with regulatory requirements as additional waste streams are characterized, we may be able to approve RH waste by Summary Waste Categories. The experience gained would then justify such an approval and could support moving from more restrictive tiering of waste streams to broader approvals of RH summary waste categories.

INL-CCP and ANL-CCP provided EPA several AK documents (CCP-AK-INL-500, CCP-AK-INL-501 and CCP-AK-INL-502) that described the results of analyses or activities performed at both sites to generate scaling factors, which are critical to the characterization of radiological components in the RH waste streams. These documents were reports, not controlled procedures, with the exception that a portion of the AK process dealing with data assembly/assimilation is included in the RH WCPIP. These reports present the results of AK-related characterization activities and do not provide the detailed procedures used to obtain the results. The reports contain the results of a process used to develop radionuclide concentrations retrospectively. They did not provide instructions whereby RH site's WC staff could perform the task in the same manner prospectively. The technical calculations and data handling that were performed to assess AK in support of the generation of radionuclide scaling factors were complex and were appropriately presented to EPA during inspection interviews and in the form of approximately 36 calculation packages. The calculation packages contained

considerable detail and represent the primary documentation of the results of the activities and processes used to derive the scaling factors. During the inspection and follow-up interviews, EPA did not obtain objective evidence documenting a set of instructions governing this waste stream-specific concentration development activity ensuring that the processes we observed at INL and ANL would be the same. Therefore, approving the DTC process beyond the waste streams evaluated during the EPA inspection, in the absence of a formal, controlled procedure for developing scaling factors would be premature. For this reason, EPA is approving the DTC process for only specific waste streams. If an RH site chooses to develop procedure(s) to control the generation of scaling factors for additional waste streams and upon EPA review of the procedure(s), EPA may, if appropriate, be able to give a broader approval of a DTC process that can be applied to a waste category.

With respect to AK, EPA does not distinguish between parts of the AK process because INL-CCP and ANL-CCP use AK for a continuum of characterization activities, from data collection through modeling and scaling factor development. The only measurement part of the characterization process, i.e., DTC, occurs well after the fundamental AK data assessment has been performed. Because the entire AK process is not formalized in a procedure or procedures for a summary waste category, and is instead applied to waste-stream specific activities, AK is approved for the waste stream evaluated during the baseline inspection and discussed in Sections 8.1 and 8.2 of the final INL and ANL baseline inspection reports. Both EPA and CCP's experience to date is limited for RH, i.e., essentially one waste stream at two sites, INL and ANL. As additional waste streams are brought forward, the need for Tier 1 change designation can be reevaluated and a tier adjustment could be made through the process identified in 40 CFR 194.8.

Comment No. 6: Section III.A.(1) of the Federal Register Notice references the June 1, 2006 version (Revision 2) of CCP-AK-INL-500. Though this revision of the report was reviewed during the June inspection, Revision 3 of this report (dated July 7, 2006) addressing comments made during this inspection was presented and reviewed during the follow-up inspections in August as documented in Inspection Report A-98-49, II-A4-69.

Response: *In Section 8.1 of this final baseline inspection report EPA has made appropriate changes to reflect Revision 3 that addresses EPA comments on the initial AK report made during the baseline inspection.*

Comment No. 7: Section III.A.(1) of the Federal Register Notice, and the associated Inspection Report A-98-49, II-A4-69 identifies "...Waste Stream No. ID-ANLE-S5000, Lots 1 through 20, as defined in CCP-AK-INL-500, Revision 2, June 1, 2006." CCP-AK-INL-500 does not define these lots. The Central Characterization Project (CCP) acceptable knowledge (AK) process was applied to a population of 549 thirty-gallon RH debris drums, which is described in CCP-AK-INL-500. Of these drums, approximately 70 had been subjected to visual examination (VE), which was recorded on audio/video media during packaging. There is no further distinction made in this waste stream inventory. The designation of "lots" has no relevance in the characterization and certification process and should be deleted. As described in CCP reference C350 prepared for EPA during the inspections, CCP determined, and EPA agreed, that further segregation of the waste stream into lots based on the radiological characterization performed by

ANLE was not appropriate. References to “lots” occur in numerous places in docket EPA-HQ-OAR-2006-0881 and the associated Inspection Report A-98-49, II-A4-69; these references should be deleted.

Response: *EPA recognizes that historic AK data is presented in “lots” by INL (and therefore EPA examined this historic data by the groupings provided by CCP), but EPA does not expect CCP to characterize this waste stream by these or any other predetermined lots.*

INL-CCP AK supporting references identify INL’s Lot assignment of “lots” and several AK documents that are important to the characterization process (e.g., EDF-6946 and EDF-6685) discuss the waste stream by INL “lots”. Therefore, portions of the EPA’s reports use the same terminology and refer to “lots” because the references examined present the information in this fashion. Appropriate changes to the text have been made when referring to the term “lots” in the context of historic AK data.

Comment No. 8: Section III.A.(3) of the Federal Register Notice states: “*The VE process used for a total of 8 retrievably-stored RH debris waste drums included in three batch data reports-BDR No. ’s RHINLVE 6001-3. CCP has terminated the use of VE process for this waste until further notice. If CCP decides to use VE in the future, EPA inspection and approval is necessary.*” This citation is incorrect. CCP used the VE process to characterize a total of 70 drums of retrievably-stored RH debris waste where the waste contents were recorded on audio/video media during waste packaging operations. The approval should apply to the process of conducting VE using audio/video media, not to a particular population of drums characterized using that process.

As stated in Section 4.0 on page 7 of both the INL EPA Inspection Report A-98-49, II-A4-69 and the ANL EPA Inspection Report A-98-49, II-A4-70: “*During an inspection, EPA does not approve characterization data; that function is the sole responsibility of the site being evaluated during the inspection...EPA evaluated the WC processes implemented by the site to characterize RH retrievably-stored debris waste.*” 40 CFR Part 194.8(b)(2) states, “*The Agency will verify the compliance of waste characterization programs and processes. . .*” Nowhere does the Agency’s mandate require or allow for the approval by EPA, on a drum-by-drum basis, waste to be shipped to WIPP. Their mandate is to ensure that the waste characterization programs and processes are compliant. By approving eight drums (and only eight drums) for shipment to WIPP, the Agency is usurping the authority of the Department of Energy (the Certifying Authority for Waste Characterization Activities) to approve drums for shipment to WIPP. The process of visual examination using audio/video media was extensively demonstrated during the inspection. EPA has not indicated any noncompliance with the process but has arbitrarily restricted its use to eight drums.

The reference to the eight containers should be removed and it is recommended that the text read as follows:

The VE process as defined in CCP-AK-INL-502, Central Characterization Project RH TRU Waste Certification Plan for 40 CFR Part 194 Compliance and Confirmation Test

Plan for INL RH Waste Stream ID-ANLE-S5000 and implemented by procedure CCP-TP-500 CCP Remote-Handled Waste Visual Examination.

This same comment applies to item 3 on page 2, and any related text, of the associated inspection report (A-98-49, II-A4-69) for EPA Baseline Inspection No. EPA-INL-CCP-RH-6.06-8.

DOE CBFO agrees the language in the VE Tiering designation in Table 2 of the Federal Register Notice correctly indicates what was inspected and should be approved regarding the VE process. DOE CBFO requests that Table 1 in the FR and the corresponding sections of the two inspection reports be made consistent with this language.

Response: *EPA's proposed approval was based on an evaluation of the VE process (i.e., visual examination of waste container contents recorded on audio/visual media), interviews with VE personnel, and review of VE personnel training records. EPA identified one finding and one concern as a result of this review and concluded that the VE process implementation was not inadequate. CCP took steps to correct the EPA-noted inadequacies (e.g., additional training to VE staff and revisions to VE procedure(s) used by the VE personnel). EPA limited its **proposed** approval to only 9 drums because CCP had categorized the remaining 61 containers as not suitable for WIPP disposal using its own NCR (non compliance reporting) process. Following the inspection, CBFO informed EPA that (a) CCP does not plan to use this VE process beyond the 70 containers (included in 4BDRs that were part of the AK documentation), and (b) the 61 NCR drums would be reevaluated using real-time radiography (RTR), or another non-destructive examination procedure, in the future.*

Since the baseline inspection, however, DOE informed EPA that all 70 RH waste containers from INL were subjected to another VE review using a better monitor. Upon the review of the video records for these drums, CCP revised the associated BDRs and after using a modified VE process (with a better monitor) CCP concluded that 60 of the 70 containers are eligible for disposal at WIPP. DOE submitted this new information to EPA.

As stated in the Comment No. 4, Commenter corrected EPA's understanding of the number of containers suitable for the disposal at WIPP saying that 19 and not 9 RH waste containers were eligible for WIPP disposal at the time of the proposal.

In the proposed approval EPA designated the reuse of the VE process (since then being retired) as a T1 change. EPA considers the use of a better monitor as a change in key VE equipment. Therefore, EPA must consider this new information as a T1 change. Since CCP used a modified VE process and the additional, (new) data generated from this action was provided during the public comment period on EPA's proposed approval, EPA must consider this as a T1 change and complete a review accordingly. Therefore, as part of the T1 change review and approval process an EPA inspector will complete a review of the modified VE process. CBFO will be notified of EPA's decision, regarding the VE of additional drums in the waste stream. EPA's T1 decision will also be posted on the EPA website at www.epa.gov/radiation/wipp.

Comment No. 9: Table 1 of the Federal Register Notice, INL-CCP RH WC process-T2 changes and the associated Inspection Report A-98-49, II-A4-69 identifies “...AK accuracy report for Lot 16 (or the appropriate Lot) wherein individual drum data assessed by INL (e.g., P030) will be compared against DTC-derived values...” As described in Comment 7 above, INL-CCP determined that the “lot” approach was not appropriate for the reasons described in reference C350 and addressed on page 20 in Inspection Report A-98-49, II-A4-69:

“These documents show that detailed analyses of AK data assembled for each drum can be performed to determine, in some detail, the estimated radiological content of each lot, recognizing that the process to develop an accurate and complete picture requires analysis well beyond that performed by the generator site, ANL-E (see item (1) above, and reference C350). This activity is also an alternative approach to characterizing waste based on the AK record that does not use DTC in the manner currently proposed by INL-CCP but instead uses various calculations and modeling efforts to determine values for the individual waste drums. INL-CCP has indicated, and EPA agrees, that this approach is time consuming (e.g., two years for 10 drums alone), and various assumptions and questions may still remain that could bring considerable uncertainty to this approach (see reference C350). This alternative approach has not been used at INL-CCP; therefore, EPA did not evaluate it in depth.”

In Inspection Report A-98-49, II-A4-69, EPA requests that INL-CCP compare AK and DTC results for ten containers (lot 16) for the purpose of determining AK accuracy as a T2 change; however, since INL-CCP has chosen to radiologically characterize the waste stream as a whole, the level of accuracy can not be determined by comparing the DTC results to those previously calculated for a small subset of containers within the stream. If any of the containers are determined to be non-transuranic (TRU) waste using the dose-to-curie (DTC) methodology, they will be reported as an AK inaccuracy. There is neither a plan nor a requirement currently in place to prepare a separate AK Accuracy Report for the ten drums cited. This requirement for a T2 change notification should be deleted from the applicable tables and the text of Docket EPA-HQ-OAR-2006-0881 and Inspection Report A-98-49, II-A4-69.

Response: *EPA’s intent behind the comparison requirement was to better understand the relationship between the results of the proposed characterization approach and data for a small number of waste containers reviewed during the baseline inspection. The comment objects to the comparison of a small set of AK data to results that were obtained through DTC because INL-CCP proposes to characterize the stream “as a whole”, and the small subset may not match the stream as characterized to that point. EPA understands this concern and also understands that there may be variability in the characterization data at any point in time. EPA has changed the T2 change to require the site to notify EPA when this data set is available. Under its authority of §194.24(h), EPA may request these data from INL-CCP in order to perform comparison as a verification of how the data sets compare. EPA believes that a comparison may provide additional insight regarding AK accuracy and help to better understand the variability of the characterization data, not to find a means to criticize INL-CCP’s characterization approach for this waste stream that this report approves. EPA has made the appropriate clarifications to the INL and ANL final baseline inspection reports to reflect this explanation.*

Note that the DTC process evaluated by EPA during the baseline inspection had been proposed for approval and is being approved now and the comparison discussed here does not affect this approval.

Comment No. 10: Table 1 of the Federal Register Notice, INL-CCP RH WC process-T2 changes and Table 1 on page 3 of the associated Inspection Report A-98-49, II-A4-69 identifies “...Completed Correlation or Surrogate Summary Form of RH containers identified in this waste stream identified as CH based upon measured dose rates that present NDA results for assayed containers, including isotopic ratios...” As described in the AK procedure of the WCPIP, a Correlation and Surrogate Form is prepared to document when contact-handled (CH) data are used to meet a required DQO for an RH waste stream. This form would not be completed unless the resulting CH assay data is specifically used to meet one of the RH DQOs. The comparison of isotopic ratios derived from modeling and mass spectrometry for the waste stream as a whole to any isotopic ratios measured via NDA for one or more individual containers is likely to be inconclusive. This is because variations in the isotopic ratios between containers is expected and may be difficult to quantify. This requirement for a T2 change notification should be deleted from cited tables and the text of the Inspection Report A-98-49, II-A4-69.

Response: *The Correlation or Summary (CSS) Form, if prepared, can easily address any discrepancies between an RH waste stream and its CH counterpart. The CSS could also add valuable information because it would provide actual assay measurement data. Accordingly, EPA requires that the site provide notification, as a T2 change notice, when the CSS Form is available for a RH waste stream.*

As stated in the previous responses to Comment Nos. 2 and 9 above, T1 and T2 reports are intended to report changes to approved waste characterization programs. As described in the final modification to 40 CFR 194.8(b) (69 FR 42581, July 14, 2004), EPA uses its authority under 194.24(h), when necessary, to evaluate new or additional information to ensure continued compliance with regulatory requirements. Under §194.24(h) authority, EPA may ask for the CSS Form for an RH waste stream in question and may also require a listing of all RH containers that are ultimately identified as CH and the measurement (i.e., NDA) data for those containers not presented on a CSS. EPA has made the appropriate clarifications to the INL and ANL final baseline inspection reports in accordance with this response.

EPA understands that the comparison of isotopic ratios derived from modeling and mass spectrometry for the waste stream as a whole to any isotopic ratios measured via NDA for one or more individual containers may be inconclusive. EPA also understands the potential for variations in the isotopic ratios between containers. We do not necessarily consider that such variations would be problematic.

Comment No. 11: On page 16 of the inspection report, in the paragraph under Table 4, it states that NDA will not be used “because of workers’ health concerns.” This entire sentence should be deleted. The DTC technique is an approved technique that is being implemented at this site and there is no reason for addressing why another technique is not being used.

Response: *We concur, the final report the text has been revised to remove reference to the worker's health concerns.*

Comment No. 12: Clarify that implementation of VE following this baseline approval is a T1 change (Table 1 of the Federal Register Notice). This should apply to VE, not to VE using audio/video media:

- a. Under VE T1 changes, the use of the VE process and data, in a manner consistent with that applied to the subject waste stream, should not require an EPA T1 approval as noted above.

Response: *When characterizing RH waste, INL CCP performed a visual examination of audio/video media depicting contents of RH waste containers. EPA has renamed the waste characterization process as "VE of audio/video media" in the Tiering tables in the Executive Summary and Conclusion sections of the report.*

Following the June 2006 baseline inspection, DOE provided additional information regarding drums that had been cited in INL-CCP non-conformance reports. Because this information identified a modified procedure for VE of this waste stream, EPA is evaluating this additional VE information as a T1 change. (For additional discussion, see Response to Comment No. 8, above.) Upon completion of the T1 evaluation, EPA may issue an approval of the modified VE process and data applying to the waste stream as a whole and not restricted to the 8 containers as proposed. As noted in the Response to Comment No. 4, above, the EPA proposed approval incorrectly states the number of containers as 9. The correct number of approved containers for the proposed approval should have been 19. EPA has been informed by CCP that it will no longer use the VE of audio/visual media process for characterizing RH containers at INL. If CCP again uses this process for visually examining audio/video media records for RH waste containers at INL, its implementation will be subject to the T1 change procedures requiring EPA notification and approval prior to implementation.

Comment No. 13: Table 2 of the Federal Register Notice, ANL-CCP RH WC process-T2 changes and Table 1 on page 3 of the associated Inspection Report A-98-49, II-A4-70 identifies "...Comparison of AK versus DTC-derived radiological data to support the use of waste stream-specific instead of drum-specific radiological data and the completed DTC results for all containers in this waste stream..." As discussed on page 20 in Inspection Report A-98-49, II-A4-70, the following language was added to the AK Report:

The stated purpose of the method employed by Argonne to estimate the radiological composition in individual waste containers was to address site accountability requirements and to comply with the maximum allowable fissile content of RH TRU drums. While the Argonne reported radiological content of containers in this waste stream was used to support the CCP waste stream delineation, RH, and TRU determinations, the Argonne methodology did not produce results adequate for the purposes of WIPP certification. For this reason, it is not appropriate to compare the Argonne estimates to the results of the CCP radiological characterization activities in AK accuracy evaluations.

For this reason, the level of accuracy can not be determined by comparing the DTC results to those previously estimated by ANLE and this stipulation should be deleted from the cited Tables and the text of the Inspection Report A-98-49, II-A4-70.

Response: *EPA concurs with the comment. The report including the Tables is modified accordingly.*

Comment No. 14: Table 1 of the Federal Register Notice, INL-CCP RH WC process-T1 and Table 2 of the Federal Register Notice, ANL-CCP RH WC process-T1 changes are identified for the addition of containers to the existing waste streams. Addition of containers to the existing waste streams should not be considered a change unless the addition of the containers changes the characteristics of the waste stream, which would require a change to the certification plan (CCP-AK-INL-502 for INL and CCP-AK-ANL-502 for ANL). As stated in Section 4.0 on page 7 of both the INL EPA Inspection Report A-98-49, II-A4-69 and the ANL EPA Inspection Report A-98-49, II-A4-70: “*During an inspection, EPA does not approve characterization data; that function is the sole responsibility of the site being evaluated during the inspection...EPA evaluated the WC processes implemented by the site to characterize RH retrievably-stored debris waste.*” Therefore, EPA is only approving the waste characterization processes implemented, such as the process used to assign waste containers to a waste stream, and not the assignment of individual, specific containers to a waste stream. As defined in the inspection reports (page 2, 6th paragraph) “*Any changes to the WC activities from the date of the baseline inspection must be reported to and if applicable, approved by EPA.*” EPA tier changes therefore, should only address changes to WC and not routine modifications performed in accordance with the WC.

This same comment applies to the corresponding tables, and any related text, in the associated inspection reports (A-98-49, II-A4-69 and A-98-49, II-A4-70) for EPA Baseline Inspection No.’s EPA-INL-CCP-RH-6.06-8 and EPA-ANL-CCP-RH-9.06-8.

Response: *EPA inspected and approved the full AK process (including scaling factor development, etc.) through interviews and evaluations that were applicable to a small sample size. It is quite possible that “new” containers would require a different approach to scaling factor development following a process that EPA has not inspected or examined. Therefore, addition of containers to the waste stream requires EPA notification to ensure that CCP has implemented a process that is well documented. If CCP seeks a broader approval in the future whereby containers could be added without review, CCP could present to EPA for approval a documented process for AK data analysis beyond that in the WCPIP. This will need to include all other AK data manipulation (e.g., scaling factor development) up to application of the DTC measurement. Until that time, EPA believes it is prudent to limit the approval to the waste stream evaluated during the baseline inspection, noting that our T1 review of waste stream expansion could be accomplished in a timely manner.*

Comment No. 15: Under AK T2 changes, the term “waste stream data package” does not appear in the Remote-Handled Transuranic Waste Characterization Program Implementation Plan (WCPIP). CBFO assumes that EPA is referring to the primary AK documents referenced

including the waste stream profile form (WSPF), the characterization reconciliation report (CRR), and the AK Summary Report.

Response: *EPA agrees that the term “waste stream data package” is broad, and CBFO’s assumption is correct. EPA is referring to the AK documents including the WSPF and CRR. If a Characterization Information Summary is prepared and includes information pertinent to EPA compliance, EPA must be notified of its availability using the T2 change notice process. EPA may request that this information be provided, consistent with 194.24(h). EPA has made the appropriate clarifications to the INL and ANL final baseline inspection reports.*

Comment No. 16: Delete the wording: “or the use of the high range probe as described in CCP-TP-504”, from footnote *** to Table 1 and Table 2 of the Federal Register and the corresponding tables in the inspection reports. Use of the high range probe is authorized in CCP-TP-504. Its operation is no different from the low- and mid-range probes that were demonstrated at the two inspections.

Response: *EPA agrees that the use of all three probes is authorized under CCP-TP-504, as discussed below. The operations observed at INL and ANL did not involve the use of the high range probe and EPA would be interested in such an application, not because of the probe itself, but because its use would require a significantly different DTC operation from what was observed during the inspections.*

As stated in the INL-CCP Report:

- *There are three ion chamber probes available for use with the RO-7 Ion Chamber: RO-7LD with a full-scale range of 1,999 mR/hr and a resolution of 1 mR/hr (Low Range); RO-7BM, with a full-scale range of 199,900 mR/hr and a resolution of 100 mR/hr (Medium Range); and, RO-7BH with a full-scale range of 199,900,000 mR/hr and a resolution of 10,000 mR/hr (High Range). The calibrations are essentially probe-specific, allowing the probes to be interchanged between ion chamber bodies.*
- *The Low Range Probe No. 802038 and the Medium Range Probe No. 801254 were in calibration at the time of the inspection. The High Range probe was not observed in use, INL-CCP personnel stated that it had been neither calibrated nor source checked. INL-CCP personnel stated that there was no intention of using this probe in the foreseeable future.*

CCP-TP-504 states that, prior to use, the high range probe requires a source check with a source of greater than or equal to 500,000 mR and less than or equal to 12,000,000 mR, i.e., a source with an external gamma exposure rate of between 500 and 12,000 R/hr (Roentgens per hour). The logistical aspects of such an operation would be considerably different from the operation observed during the inspections, and EPA wants to know about this in advance and have the opportunity to evaluate it prior to or during its application.