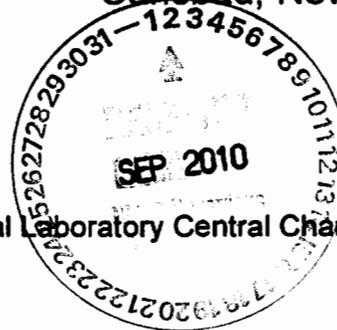


Carlsbad Field Office

Carlsbad, New Mexico 88221

memorandum



DATE: SEP 2 2010

REPLY TO
ATTN OF: CBFO:QA:DSM:MAG:10-1383:UFC 2300.00

SUBJECT: Interim Audit Report A-10-23 of the Argonne National Laboratory Central Characterization TRU Waste Characterization and Certification

TO: Dale Dietzel, DOE-CH

The Carlsbad Field Office (CBFO) conducted Audit A-10-23 of the Argonne National Laboratory Central Characterization Project (ANL/CCP) TRU Waste Characterization and Certification on August 3-5, 2010. The interim audit report is attached.

The audit team concluded that the ANL/CCP technical and quality assurance programs for these activities were adequate for compliance with the Waste Isolation Pilot Plant (WIPP) Hazardous Waste Facility Permit, the CBFO *Quality Assurance Program Document*, and the Waste Acceptance Criteria. The audit team also concluded that, overall, the ANL/CCP programs and procedures were satisfactorily implemented and effective.

If you have any questions or comments, please contact me at (575) 234-7491.

Dennis S. Miehl
Senior Quality Assurance Specialist

Attachment

cc: w/attachment

- | | | | |
|-----------------------|------|--------------------------------|----|
| A. Holland, CBFO | * ED | S. Ghose, EPA | ED |
| D. Gadbury, CBFO | ED | R. Lee, EPA | ED |
| M. Navarrete, CBFO | ED | S. Zappe, NMED | ED |
| J. R. Stroble, CBFO | ED | S. Holmes, NMED | ED |
| K. Joshi, DOE-CH | ED | T. Kesterson, DOE OB WIPP NMED | ED |
| D. Haar, WTS/CCP | ED | D. Winters, DNFSB | ED |
| D. Ploetz, WTS/CCP | ED | C. Timm, PECOS | ED |
| V. Cannon, WTS/CCP | ED | G. Lyshik, LANL-CO | ED |
| A. J. Fisher, WTS/CCP | ED | P. Gilbert, LANL-CO | ED |
| M. Walker, WTS/CCP | ED | P. Hinojos, CTAC | ED |
| Y. Salmon, WTS/CCP | ED | K. Martin, CTAC | ED |
| J. Hoff, WTS | ED | G. Knox, CTAC | ED |
| M. A. Mullins, WTS | ED | WWIS Database Administrators | ED |
| M. Eagle, EPA | ED | WIPP Operating Record | ED |
| E. Feltcorn, EPA | ED | CBFO QA File | |
| R. Joglekar, EPA | ED | CBFO M&RC | |

*ED denotes electronic distribution



U.S. DEPARTMENT OF ENERGY
CARLSBAD FIELD OFFICE

INTERIM AUDIT REPORT

OF THE

ARGONNE NATIONAL LABORATORY (ANL)
CENTRAL CHARACTERIZATION PROJECT (CCP)

CARLSBAD, NM, AND ARGONNE, IL

AUDIT NUMBER A-10-23

August 3 – 5, 2010

TRU WASTE CHARACTERIZATION AND CERTIFICATION



Prepared by: _____

Greg Knox
Greg Knox, CTAC
Audit Team Leader

Date: 2 SEP 10

Approved by: _____

Ava L. Holland
Ava L. Holland, Director
CBFO Office of Quality Assurance

Date: 9/2/10

1.0 EXECUTIVE SUMMARY

Carlsbad Field Office (CBFO) Certification Audit A-10-23 was conducted to evaluate the continued adequacy, implementation, and effectiveness of Argonne National Laboratory (ANL) transuranic (TRU) waste characterization activities performed for ANL by the Washington TRU Solutions LLC (WTS) Central Characterization Project (ANL/CCP). The activities reviewed were for characterization and certification of remote-handled (RH) Summary Category Group (SCG) S5000 debris waste. The activities are performed consistent with the requirements described in the Waste Isolation Pilot Plant (WIPP) Hazardous Waste Facility Permit (HWFP), the *Remote-Handled Transuranic Waste Characterization Program Implementation Plan* (WCPIP), the *CBFO Quality Assurance Program Document* (QAPD), and the *Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant* (WAC).

The audit was conducted simultaneously in Carlsbad, NM, and Argonne, IL, August 3 – 5, 2010. The audit team concluded that overall, the ANL/CCP technical procedures are adequate relative to the flow-down of requirements from the HWFP, the WCPIP, the CBFO QAPD, and the WAC. Additionally, the ANL/CCP technical areas evaluated are satisfactorily implemented and effective.

The audit team concluded that the established quality assurance (QA) program for the related activities was adequate for compliance with the *CCP Transuranic Waste Quality Assurance Characterization Project Plan* (QAPjP), and that the associated implementing procedures were satisfactorily implemented and effective.

The audit team identified two concerns during the audit. A concern in the area of project-level validation resulted in the issuance of CBFO Corrective Action Report (CAR) 10-048, and a concern in the area of visual examination resulted in the issuance of CBFO CAR 10-049. The team also offered two Recommendations in the area of acceptable knowledge for consideration by ANL/CCP management. The CARs and Recommendations are described in section 6.0.

The CBFO Office of the National TRU Program (NTP) requested the audit team evaluate a new radiological characterization process for ANL Fuel Examination Waste (FEW) material. The NTP A-10-23 Scope letter identified the process as "Gravimetric and Dimensional Measurement". Based on the documentation presented during the audit, the team was unable to fully evaluate the adequacy, implementation or effectiveness of the process as presented by ANL/CCP. Therefore, the team's evaluation of the gravimetric or dimensional measurement for the characterization of FEW material is deemed indeterminate.

2.0 SCOPE

The audit team evaluated the adequacy, implementation, and effectiveness of the ANL/CCP RH TRU waste characterization activities. The following elements were evaluated.

Technical

Acceptable Knowledge (AK)
Project-level Validation and Verification (V&V)
Visual Examination (VE)
Headspace Gas (HSG)
Dose-to-Curie (DTC)
Gravimetric and Dimensional Measurement (GDM)
WIPP Waste Information System (WWIS)/Waste Data System (WDS)

Quality Assurance

The following QA elements were evaluated only to the extent needed to support the technical elements listed above.

Control of Nonconforming Items
Personnel Qualification and Training
QA Records
Sample Control
Container Management

The evaluation of ANL/CCP RH TRU waste activities and documents was based on current revisions of the following documents:

- *CBFO Quality Assurance Program Document*, DOE/CBFO-94-1012
- *Waste Isolation Pilot Plant Hazardous Waste Facility Permit*, NM4890139088-TSDF, New Mexico Environment Department
- *Remote-Handled Transuranic Waste Characterization Program Implementation Plan (WCPIP)*, DOE/WIPP-02-3214
- *Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant*, DOE/WIPP-02-3211
- *CCP Transuranic Waste Quality Assurance Characterization Project Plan (QAPjP)*, CCP-PO-001
- *CCP Transuranic Waste Certification Plan*, CCP-PO-002
- *ANL/CCP RH TRU Waste Interface Document*, CCP-PO-500
- Related technical and QA implementing procedures

3.0 AUDIT TEAM, MANAGEMENT REPRESENTATIVES, AND OBSERVERS

Dennis Miehl	CBFO QA Management Representative
Greg Knox	Audit Team Leader, CBFO Technical Assistance Contractor (CTAC)
Porf Martinez	Auditor, CTAC
Tammy Bowden	Auditor, CTAC
Berry Pace	Auditor, CTAC
Rick Castillo	Auditor, CTAC
Harold Washington	Auditor, CTAC
Dick Blauvelt	Technical Specialist, CTAC
Rhett Bradford	Technical Specialist, CTAC
Paul Gomez	Technical Specialist, CTAC
Jim Oliver	Technical Specialist, CTAC

OBSERVERS

Tom Morgan	CBFO/NTP
Ricardo Maestas	New Mexico Environment Department (NMED)

4.0 AUDIT PARTICIPANTS

The ANL/CCP individuals contacted during the audit process are identified in Attachment 1. A pre-audit meeting was held by teleconference in Carlsbad, NM, and Argonne, IL, on August 3, 2010. Discussions were conducted with ANL/CCP management and staff to keep them apprised of the audit activities. The audit concluded with a post-audit meeting held by teleconference in Carlsbad, NM, and Argonne, IL, on August 5, 2010.

5.0 SUMMARY OF AUDIT RESULTS

5.1 Program Adequacy and Implementation

The audit team concluded that overall, the applicable ANL/CCP TRU waste characterization activities for RH SCG S5000 debris waste as described in the implementing procedures are adequate, satisfactorily implemented, and effective.

Attachment 2 contains a summary table of audit results. Audit activities, including objective evidence reviewed, are described below and in checklists and/or objective evidence reviewed forms. Attachment 3 contains a list of ANL/CCP documents audited. Attachment 4 lists the processes and equipment evaluated during the audit.

5.2 Quality Assurance Activities

5.2.1 Control of Nonconforming Items

The audit team interviewed the appropriate personnel and performed a document review of nonconformance reports in relation to B6-1 Items 44 and 45. The team reviewed Procedures CCP-QP-005, Revision 18, CCP TRU Nonconforming Item Reporting and Control, and CCP-QP-004, Revision 9, CCP Corrective Action Management. Implementation of the noted procedures, where applicable, was verified via document review of the e-mail documentation, NCR Logs and NCRs noted below:

ANL (East) Nonconformance Report Logs:

RHANL NCR LOG 2010
RHANL NCR LOG 2009
RHANL NCR LOG 2007

Nonconformance Reports:

NCR-RHANL-0500-10, Rev. 0
NCR-RHANL-0500-07, Rev. 0
NCR-RHANL-0002-09, Rev. 0
NCR-RHANL-0001-09, Rev. 0

The audit team reviewed e-mail documentation from the CCP Certification Manager to the WTS QA Engineer, sent 7/26/10, stating that NCR-RHANL-0500-10, Rev. 0, was "Not Reportable."

Per document review, the audit team member confirmed NCR Final Disposition Verification, as applicable.

In conclusion, the audit team identified no concerns or issues related to nonconforming items and corrective action. Subject activities were determined to be adequate, satisfactorily implemented, and effective.

5.2.2 Personnel Qualification and Training

The audit team interviewed personnel and reviewed documentation to verify that ANL/CCP complies with the requirements of QAPD Section 1.2, Personnel Qualification and Training. Training and qualification records, including the RH-ANL List of Qualified Individuals (LOQI), were reviewed for ANL/CCP AK experts, Site Project Managers (SPMs), DTC and VE personnel. Personnel qualification and training activities were conducted by ANL/CCP in accordance with CCP-QP-002, *CCP Training and Qualification Plan*.

The audit team also verified sustained corrective actions for CBFO CAR 09-056, issued during Audit A-09-21, pertaining to SPM Qualification cards for DTC and VE. As a

result, since no similar conditions were encountered during this audit, the audit team concluded that the corrective actions taken for CAR 09-056 were suitable in precluding recurrence.

Overall, the audit team concluded that the processes for personnel qualification and training were adequate, satisfactorily implemented, and effective.

5.2.3 QA Records

The audit team interviewed personnel and reviewed documentation to verify that ANL/CCP complies with the requirements of QAPD Section 1.5, Records. The records were properly managed and stored. Records activities were conducted by ANL/CCP in accordance with Procedures CCP-QP-008, *CCP Records Management*, and CCP-QP-028, *CCP Records Filing, Inventorying, Scheduling, and Dispositioning*.

The audit team verified that CCP has established and maintains a Department of Energy (DOE) Records Inventory and Disposition Schedule (RIDS) encompassing all RH sites. The audit team did not identify any issues or concerns relative to QA records.

Overall, the audit team concluded that the processes for managing and controlling records were adequate, satisfactorily implemented, and effective.

5.2.4 Sample Control

Sample control was not observed during the audit at ANL/CCP, since HSG sampling was not being performed during the audit. However, HSG sample control documentation was evaluated in Carlsbad during the review of HSG batch data reports (BDRs) generated by ANL/CCP since the A-09-21 audit. No concerns were identified in the area of Sample Control (see section 5.3.2).

Overall, the audit team concluded that sample control processes were adequate, satisfactorily implemented, and effective.

5.2.5 Container Management

The audit team conducted interviews with responsible personnel and reviewed implementing Procedure CCP-TP-509, Rev. 2, *CCP Remote-Handled Transuranic Container Tracking*, relative to container management activities, to determine the degree to which procedures adequately address upper-tier requirements. Container management of RH containers processed by ANL/CCP was verified by reviewing the RH ANLE AK Tracking Spreadsheet and RH container management database, and through field observations of containers in characterization areas.

Overall, the audit team concluded that container management processes were adequate, satisfactorily implemented and effective.

5.3 Technical Activities

5.3.1 Acceptable Knowledge

Evaluations were conducted for an RH TRU mixed waste debris stream, designated as AERHDM, generated in the ANL Alpha Gamma Hot Cell Facility (AGHCF) and the K Wing hot cells. The audit team specifically addressed the WAP requirements listed on the B6-3 checklist along with portions of the B6-1 checklist. Objective evidence was reviewed and compiled to demonstrate compliance with each of the applicable requirements on the checklists. The team also reviewed the AK record in relation to specific and relevant requirements of the RH TRU WCPIP, Rev. 1. This waste stream originally consisted of forty-four 30-gallon drums for which CCP reviewed the VE tapes of packaging performed by ANL staff. Subsequently, the waste stream has been expanded with the packaging of additional debris drums in the AGHCF, which CCP personnel have witnessed under a certified VE process. In addition, the AK record for debris waste from the K Wing hot cells has been examined and drums from this location have been added to waste stream AERHDM.

The audit team reviewed the latest revision to the AK Summary Report for this waste stream, a copy of the Waste Stream Profile Form (WSPF) and attachments, and numerous AK source documents to establish support for the conclusions noted in the AK Summary, particularly with respect to support for the waste stream chemicals and hazardous waste numbers (HWNs) listed in AK Summary Table 3 for operations in both the AGHCF and K Wing hot cells. The team also examined AK attachments addressing a crosswalk between the AK Source Documents and the WAP requirements, the reference list of AK Source Documents, the hazardous waste constituents list, the waste form, waste material parameters, prohibited items, AK package Attachment 6, and a container inventory listing. The auditors reviewed several discrepancy reports resolving discrepancies in the AK record.

The required traceability exercise was performed for four drums from those that have been completely through the characterization and certification process, including three drums from each of the three HSG sampling lots and a fourth drum selected from the certified population. In addition to the HSG BDRs, the audit team reviewed the relevant VE BDRs and DTC data packages. Project tracking system (PTS) screen-shots for the traceability drums were also compiled. The estimated waste material parameter weights for this stream and supporting documentation were reviewed. An examination of the AK Accuracy Report, AK Expert (AKE) and SPM training records, and the reconciliation of the characterization data with the AK record, including a review of the AK Characterization Checklists, completed the AK WAP review process.

The audit team also examined the AK record and compiled objective evidence that demonstrated compliance with the requirements of the WCPIP as noted above. Documents reviewed included the WCPIP WSPF, AK Accuracy Report, and Characterization Reconciliation Report, along with examination of relevant AK Source documents.

The audit team provided two Recommendations for the AK portion of the audit. The first recommended that the list of prohibited items on AK Attachment 6 be reconciled with the language in the AK Summary and the description of the packaging for the waste in this stream be expanded and clarified. The second Recommendation addressed language in section 4.2 of the PIP-required RH TRU Certification Plan CCP-AK-ANLE-502 regarding survey measurements of the waste container that should be removed (see section 6).

Overall, the audit team concluded that AK processes were adequate, satisfactorily implemented and effective.

5.3.2 Project-Level Validation and Verification

The audit team evaluated the capabilities of ANL/CCP to perform project-level V&V of BDRs. The following BDRs were evaluated by the team.

RHANLVE100001	ANHSGS100001	ANHSGS100002
RHANLVE100005	ECL10012G	ECL10014G
RHANLVE100008	ECL10012M	ECL10014M

Dose to Curie BDRs:

ANLRHDTC10001
ANLRHDTC10003
ANLRHDTC10005

The audit team determined that the project-level review of the BDRs was adequate, and confirmed that the reports were reviewed by the responsible SPMs for the VE and HSG BDRs. The audit team performed an evaluation on the analysis reports reviewed by the laboratory. Consequently, a concern was issued with regard to the laboratory and field duplicate results. The audit team noted that the SPM had incorrectly answered questions on the SPM checklist for several BDRs. This concern resulted in issuance of accelerated CBFO CAR 10-048 (see section 6).

Overall, the audit team concluded that the project-level activities evaluated were adequate, satisfactorily implemented, and effective.

5.3.3 Headspace Gas Sampling

The audit team evaluated the capabilities of ANL/CCP to sample RH waste from SCG S5000 (debris) for offsite HSG analysis. HSG sampling of RH S5000 debris waste is performed using SUMMA[®] canisters. HSG sampling was not being performed at ANL at the time of the audit; therefore the evaluation of HSG sampling was performed on HSG BDRs generated since the previous CBFO Audit (A-09-21).

The audit team determined that the following processes and documentation are compliant: sampling BDRs ANHSGS100001 and ANHSGS100002, Drum Age Criteria (DAC), sample chain-of-custody (COC), canister tags, quality control sample collection, and sample shipment to the analytical laboratory. Additionally, training and qualification of HSG personnel were confirmed to be compliant with the CCP program. Furthermore, associated measuring and test equipment (M&TE) was determined to be correctly labeled and calibrated as required.

Overall, the audit team concluded that the HSG sampling activities were adequate, satisfactorily implemented, and effective.

5.3.4 Visual Examination

The audit team evaluated the adequacy, implementation, and effectiveness of ANL/CCP VE characterization process for RH SCG S5000 debris waste.

ANL/CCP uses the two-operator method when performing VE characterization. VE is performed by two qualified operators as the waste is visually examined and placed into containers.

The audit team reviewed Procedures CCP-TP-500, Rev. 9, *CCP Remote-Handled Waste Visual Examination*, CCP-TP-163, Rev. 2, *CCP Evaluation of Waste Packaging Records for Visual Examination of Records*, and CCP-QP-002, Rev. 29, *CCP Training and Qualification Plan*, to determine their adequacy in addressing upper-tier requirements. The review determined that the procedures adequately address requirements.

The audit team examined training records for five VE operators and confirmed the appointment of two ANL/CCP VE Experts (VEEs). The audit team identified a potential concern during the review of the training files. No documentation could be provided to verify that the ITR for BDR RHANLE100007 had read AK Summary CCP-AK-ANLE-500, Rev. 5, dated January 14, 2010. Upon further investigation it was determined that CCP Standing Order CCP-SO-057, Rev. 0, dated 2-15-10, clarifies the criteria to determine the significance of an AK Summary revision and directs the appropriate training documentation. CCP-QP-002 was revised on 5/26/2010 to incorporate this standing order. Per Procedure CCP-QP-002, Rev. 28, section 4.2, CCP-AK-ANLE-500, Rev. 5 does not require additional documentation of training as the changes did "not affect waste generating processes, typical packaging configurations or expected waste material parameters expected to be found in each waste matrix code." The first evidence of work performed to CCP-AK-ANLE-500, Rev. 5 by the ITR in question was on 6/5/2010. Therefore, there is no requirement for documented training to CCP-AK-ANLE-500, Rev. 5 by the ITR.

The audit team examined the following RH VE BDRs from operations performed in the K Wing hot cell in Building 205 and the AGHCF in Building 212 to verify implementation and compliance with the CCP-TP-500 requirements for documenting VE activities.

RHANLVE090003
RHANLVE100001
RHANLVE100002
RHANLVE100003
RHANLVE100004
RHANLVE100005
RHANLVE100006
RHANLVE100007

During review of these BDRs, the audit team identified one condition adverse to quality. Procedure CCP-TP-500, Rev. 9, Section 4.1.1 [A.1] states "Record the following information on Attachment 1: Site Identification (ID) and Location of Packaging Activity." Nine of the BDRs reviewed did not have the "Location and Packaging Activity" information recorded on Attachment 1, Visual Examination Data. This concern resulted in CBFO CAR 10-049 (see section 6).

ANL/CCP has not performed VE utilizing CCP-TP-163, Rev. 2, *CCP Evaluation of Waste Packaging Records for Visual Examination of Records*, since the last audit. VE operations were not being performed in the K Wing hot cell in Building 205 at the time of the audit. The audit team interviewed VE operators and a VEE, and examined VE operational logbooks. The audit team observed VE operations in the Building 212 AGHCF involving placement of RH SCG S5000 debris waste into 7-gallon container number 635.

The audit team also verified sustained corrective actions for CBFO CAR 09-057, issued during Audit A-09-21, pertaining to VEE appointment letters. As a result, since no similar conditions were encountered during this audit, the audit team concluded that the corrective actions taken for CAR 09-057 were suitable in precluding recurrence.

With the exception of the concern documented in CAR 10-049, the VE characterization activities were determined to be adequate in addressing upper-tier requirements as applicable, satisfactorily implemented, and effective.

5.3.5 WIPP Waste Information System (WWIS)/Waste Data System (WDS)

The audit team evaluated the adequacy of CCP Procedure CCP-TP-530, *CCP RH TRU Waste Certification and WWIS/WDS Data Entry*, with respect to the CBFO QAPD and determined that the procedure contains adequate flow-down of upper-tier requirements related to RH operations at the ANL host facility.

The audit team interviewed CCP project-level personnel, witnessed a demonstration of WWIS/WDS data entry, and reviewed the following documents:

Canister AE0044 package, containing Inner Drums 913H, 923H, and 930H
- Removable Lid Canister Loading Form

- Waste Container Data Report from WWIS

Canister AE0045 package, containing Inner Drums 936H, 938H, and 941H

- Removable Lid Canister Loading Form
- Waste Container Data Report from WWIS

Overall, the audit team determined that the WWIS/WDS activities were adequate, satisfactorily implemented, and effective.

5.3.6 Dose-to-Curie (DTC)

The audit team assessed the continuing adequacy, implementation, and effectiveness of the DTC methodology used at ANL/CCP to characterize waste stream AERHDM. The audit team evaluated the actual measurement of the dose rate and the determination of required waste container data. For DTC, the dose rate is defined as the external exposure rate from gamma-ray emitting radionuclides within the waste matrix, predominately cesium-137 (Cs-137). The application of the DTC methodology at ANL to characterize RH TRU waste was previously evaluated by CBFO as part of Audit A-09-21.

Based on a review of the current revisions of CCP procedures, reports, and waste data provided prior to the audit, a checklist was prepared and used to evaluate the following.

- Development of average radionuclide ratios through modeling and confirmatory testing
- Development of the relationship between the measured dose or exposure rate and the activity of Cs-137
- Measurement of the external dose or exposure rate of the waste containers
- Calculation of the radionuclide activities and other derived radiological quantities and associated uncertainties
- Any significant program changes or deviation since Audit A-09-21
- Results of applying the DTC methodology to characterize waste since Audit A-09-21
- Determination of the number of containers examined, completed BDRs, and BDRs that had been through project-level review that were generated since Audit A-09-21
- Completed BDRs to ensure data are reported and reviewed as required
- Data storage and retrievability
- Personnel qualification and training

- Continued operability and condition of the equipment used in the DTC method since Audit A-09-21

The source of the RH waste at the ANL was the examination of fuel pins and reactor materials in the AGHCF. Scaling factors were developed from information about these fuel pins and reactor materials. This information included the fuel's initial composition and irradiation history. The ORIGEN2.2 computer code was used to model the burn-up of nuclear fuel, including the decay and in-growth of progeny radionuclides, to arrive at a radionuclide inventory. This radionuclide inventory was used to estimate the ratios of the activities of all radionuclides present in any appreciable quantity and particularly any of the 10 WIPP-tracked radionuclides present to that of Cs-137.

To confirm the ORIGEN2.2 modeling results, radionuclide ratios were calculated for approximately 400 fuel pins that were also examined at the Los Alamos National Laboratory (LANL) using mass spectrometry. The modeled values were compared to the mass spectrometry results. Agreement between the ratios calculated using ORIGEN2.2 and those measured by mass spectrometry demonstrate that ORIGEN2.2 is an appropriate model for calculating the radionuclide ratios for irradiated fuel pins with fuel compositions and irradiation histories similar to those examined at LANL.

The DTC measurement apparatus was moved to the Building 331 Shell after completion of the measurements for the seven drums in BDR ANLRHDT07004 (evaluated as part of Audit A-08-24). The exposure rate, attributed entirely to Cs-137, is measured four times at a distance of 1 meter from the waste containers. The audit team interviewed operations personnel regarding the set-up and calibration of the measurement apparatus for performing DTC. The audit team also observed DTC measurements in the 331 Shell (Drum #18888). A Thermo Electron Model RO-7 survey meter fitted with the appropriate probe (RO-7LD or RO-7BM) is used to gather high-range measurements, and a Model FH 40G fitted with a FHZ 612 probe is used to gather low-range measurements. Each container is rotated 90 degrees successively between each of the four measurements. The average measured dose or exposure rate for each 30-gallon waste container and associated scaling factors are used to estimate the activity of individual radionuclides and other derived radiological quantities and associated uncertainties.

Since Audit A-09-21, six BDRs have been completed through project-level review (ANLRHDT09003 - nine 30-gallon containers; ANLRHDT10001 - sixteen 30-gallon containers; ANLRHDT10002 - seventeen 30-gallon containers; ANLRHDT10003 - ten 30-gallon containers; ANLRHDT10004 - eight 30-gallon containers; and ANLRHDT10005 - five 55-gallon containers). These BDRs consist of a total of sixty 30-gallon drums and five 55-gallon drums.

The audit team also verified sustained corrective actions for CBFO CAR 09-055, issued during Audit A-09-21, pertaining to DTC operational logbooks. As a result, since no similar conditions were encountered during this audit, the audit team concluded that the corrective actions taken for CAR 09-055 were suitable in precluding recurrence.

Overall, the audit team determined that DTC procedures and activities were determined to be adequate, satisfactorily implemented, and effective.

5.3.7 Gravimetric and Dimensional Measurement

The audit team was requested by the NTP to evaluate the adequacy, implementation, and effectiveness of a new methodology used at the ANL/CCP to characterize waste specimens in waste stream AERHDM. The audit team evaluated the actual measurement of the weight or length of waste specimen material and the determination of required waste container data. This new method has not been previously evaluated at ANL.

A checklist was prepared based on a review of the current revisions of the following documents provided prior to and during the audit.

- CCP Standing Order CCP-SO-ANLE-003 RO, *Conduct length measurements of FEW and compare the results to the measurements in the AK Record*
- CCP-TP-506, *CCP Preparation of the Remote-Handled Transuranic Waste Acceptable Knowledge Characterization Reconciliation Report*
- CCP-AK-ANL-505C, *Central Characterization Project Fuel Weight Confirmation Test Program for Argonne Remote-Handled K-Wing Fuel Examination Waste, Waste Stream: AERHDM*
- Calculation packages ANLE-RH-20, ANLE-RH-21, ANLE-RH-22, ANLE-RH-23, ANLE-RH-24, ANLE-RH-25, ANLE-RH-26, ANLE-RH-27, ANLE-RH-35, ANLE-RH-36, ANLE-RH-37, ANLE-RH-38
- Operational logbook RH-ANLE-WS-001, *2010 K-Wing Hotcells, Building 205 ANL*

The checklist was used to evaluate:

- Development of average radionuclide concentrations as a function of length or mass through modeling and confirmatory measurements
- Measurement of the length or mass of fuel specimens
- Calculation of the radionuclide activities and other derived radiological quantities and associated uncertainties
- Determination of the number of specimens examined and completed calculation packages
- Data storage and retrievability
- Personnel qualification and training

The source of the RH waste at the ANL was the examination of fuel pins and reactor materials in the AGHCF. The remainder of the waste material, from which the material examined in the AGHCF was derived, is predominantly intact cylindrical specimens and, to a lesser extent, the residue of additional experimentation. AK information about the intact cylindrical specimens was gathered to facilitate characterization. This information includes the specimen length, the fuel's initial composition, and irradiation history. The ORIGEN2.2 computer code was used to model the burn-up of nuclear fuel, including the decay and in-growth of progeny radionuclides, to arrive at a radionuclide inventory as a function of length. The length measurements for the intact cylindrical specimens are compared to AK records in order to confirm the AK measurements. All intact cylindrical fuel specimens will be measured for length and the result compared to the AK record. A similar process was followed for the few specimens that were no longer intact cylinders except that, in the case of these specimens, the radionuclide inventory information was developed as a function of specimen weight. Approximately 50 of the waste specimens that are not intact cylinders were already packaged. Nine specimens were weighed prior to the audit as a representative sample to confirm the AK record weights. These weights are recorded in operational logbook RH-ANLE-WS-001, 2010 *K-Wing Hotcells, Building 205 ANL*.

ORIGEN2.2 modeling results were previously confirmed by comparing radionuclide quantities calculated for approximately 400 fuel pins that were also examined at LANL using mass spectrometry. The modeled values were compared to the mass spectrometry results. Agreement between the ratios calculated using ORIGEN2.2 and those measured by mass spectrometry demonstrate that ORIGEN2.2 is an appropriate model for calculating radionuclide quantities for waste derived from irradiated fuel pins with fuel compositions and irradiation histories similar to those examined at LANL.

Though one element of the technical approach, length or weight measurement, is a simple process, the remainder of the technical approach, determining initial fuel composition, burn-up history, and discharge date with associated ORIGEN2.2 computer runs and the derivation of uncertainties is much more complex, commensurate with the DTC methodology. The auditors were not presented with a set of governing and implementing documents with associated technical and management reviews commensurate with other characterization methods. No concerns were identified regarding the technical approach or the technical work conducted to the point of assembly and validation of the individual calculation packages. However, the ultimate implementation of this new method was deemed indeterminate.

Overall, procedures and activities associated with this new process were deemed indeterminate with respect to adequacy, implementation and effectiveness.

6.0 SUMMARY OF DEFICIENCIES

6.1 Corrective Action Reports

During the audit, the audit team may identify conditions adverse to quality (CAQs) and document such conditions on corrective action reports (CARs).

Condition Adverse to Quality (CAQ) – Term used in reference to failures, malfunctions, deficiencies, defective items, and nonconformances.

Significant Condition Adverse to Quality – A condition which, if uncorrected, could have a serious effect on safety, operability, waste confinement, TRU waste site certification, compliance demonstration, or the effective implementation of the QA program.

Two CBFO CARs, briefly described below, were issued as a result of Audit A-10-23.

CBFO CAR 10-048

CCP-TP-001, Section 4.2.7 states in part "Verify that data are within established data assessment criteria and meet all applicable QAOs: Precision, Accuracy, Completeness, Comparability, and Representativeness". [NOTE] To answer questions regarding specific criteria being met, (i.e., QAOs, QCs), the SPM/Designee must ensure that the information presented in the BDR meets the requirements identified in CCP-PO-001, CCP-PO-002, and CCP-PO-003, *CCP Transuranic Authorized Methods for Payload Control (CCP CH-TRAMPAC)*.

The Site Manager Checklist form CCP-TP-001, Attachment 11, Questions 25, 26, and 27 were answered N/A for required checks based on CCP-PO-001 Tables B1-3 and B3-3 to complete precision, accuracy, completeness, comparability, and representativeness. The Site Project Manager evaluation of the laboratory and field duplicates reported in batch data reports ECL10012G, ECL10012M, ECL10014G, and ECL10014M, indicated Not Applicable (N/A) instead of indicating "YES"; furthermore, the N/A comment indicated "Only applicable for an on-line system." This requirement applies to all on-line duplicates and laboratory duplicates.

CBFO CAR 10-049

Procedure CCP-TP-500, Rev. 9, Section 4.1.1 [A.1] states, "Record the following information on Attachment 1: Site Identification (ID) and Location of Packaging Activity."

The following BDRS did not have the "Location of Packaging Activity" recorded on Attachment 1, Visual Examination Data Form: RHANLVE090003, RHANLVE100001, RHANLVE100002, RHANLVE100003, RHANLVE100004, RHANLVE100005, RHANLVE100006, RHANLVE100007 and RHANLVE100008.

6.2 Deficiencies Corrected During the Audit

During the audit, the audit team may identify CAQs. The audit team members and the audit team leader (ATL) evaluate the CAQs to determine if they are significant. Once a determination is made that the CAQ is not significant, the audit team member, in conjunction with the ATL, determines if the CAQ is an isolated case requiring only remedial action and therefore can be corrected during the audit.

Upon determination that the CAQ is isolated, the audit team member, in conjunction with the ATL, evaluates/verifies any objective evidence/actions submitted or taken by the audited organization and determines if the condition was corrected in an acceptable manner. Once it has been determined that the CAQ has been corrected, the ATL categorizes the condition as a CDA according to the following definition:

CDAs – Isolated deficiencies that do not require a root cause determination or actions to preclude recurrence. Correction of the deficiency can be verified prior to the end of the audit. Examples include one or two minor changes required to correct a procedure (isolated), one or two forms not signed or not dated (isolated), and one or two individuals that have not completed a reading assignment.

There were no CDA issues identified and documented during the audit.

6.3 Observations

During the audit, the audit team may identify potential problems that should be communicated to the audited organization. The audit team members, in conjunction with the ATL, evaluate these conditions and classify them as Observations using the following definitions:

Observation – A condition that, if not controlled, could result in a CAQ.

No Observations were provided to ANL/CCP management as a result of the audit.

6.4 Recommendations

During the audit, the audit team may identify potential problems or suggestions for improvement that should be communicated to the audited organization. The audit team members, in conjunction with the ATL, evaluate these conditions and classify them as Observations or Recommendations using the following definitions:

Recommendations – Suggestions that are directed toward identifying opportunities for improvement and enhancing methods of implementing requirements. Once a determination is made, the audit team member, in conjunction with the ATL, categorizes the condition appropriately.

Recommendation 1

- a) The listing of potential prohibited items identified in AK Attachment 6 should be made consistent with the discussion of prohibited items in the AK Summary Report for waste stream AERHDM.

- b) The discussion of container packaging configurations for the AGHCF and K Wing waste in sections 2.0 and 5.5 of the AK Summary Report should be expanded and clarified.

Recommendation 2

CCP-AK-ANLE-502, *CCP RH TRU Waste Certification Plan for 40 CFR Part 194 Compliance and Confirmation Test Plan for ANL RH Waste Stream AERHDM*, Section 4.2 "DQO for TRU Waste Determination" states; ".....survey measurements will be taken using survey methods and procedures as required by the applicable Site Health Physics Program using approved....."

It is recommended that this statement be removed from Section 4.2 since this survey/measurement applies to the DQO described in Section 4.3 for an RH Waste Determination (surface does rate of waste container) as required by the WAC.

7.0 LIST OF ATTACHMENTS

- | | |
|---------------|---|
| Attachment 1: | Personnel Contacted During the Audit |
| Attachment 2: | Summary Table of Audit Results |
| Attachment 3: | Listing of Audited Documents |
| Attachment 4: | Processes and Equipment Evaluated During CBFO Audit A-10-23 |

PERSONNEL CONTACTED DURING THE AUDIT

PERSONNEL CONTACTED DURING AUDIT A-10-23				
NAME	TITLE/ORG	PRE-AUDIT MEETING	CONTACTED DURING AUDIT	POST-AUDIT MEETING
Beallis, P.	VE/DTC Operator/WMO		X	
Billett, M.	Training Coordinator/CCP		X	
Bond, E.	Sr. Tech./WMO		X	
Campbell, E.	Load Manager/ANL		X	
Cannon, V.	QAM/CCP	X	X	X
Delgodillo, J.	DTC Rigger/ANL		X	
Dietzel, D.	Fed. Proj. Director/DOE-ASO	X		X
Doherty, M.	AKE/CCP	X	X	
Fesmire, C.	TRU Waste Int. Mgr./CBFO	X		
Fisher, A.J.	Sr. Tech Advisor/CCP	X		
Geller, J.	QA Engineer/ANL-FMS	X		
Griffith, M.	DTC LO/CCP	X	X	
Hinojas, F.	Training Manager/CCP		X	
Hlotke, J.	Sr. Tech./FMS-NOD		X	
Hodge, D.	NPTRU PM/ANL-FMS	X		
Hudston, L.	NDA Support/CCP	X		
Jones, L.	QAE/CCP		X	
Kbsawski, K.	DTC OPT/ANL		X	
Kirkes, C.	WCO/CCP		X	
Maestas, R.	Observer/NMED	X		X
Morgan, T.	Observer/CBFO-NTP	X		X
Mueller, T.	QAE/CCP		X	
Nelson, L.	SPM/CCP	X	X	X
Pancake, D.	AGHCF PM/ANL-FMS	X	X	X

PERSONNEL CONTACTED DURING AUDIT A-10-23				
NAME	TITLE/ORG	PRE-AUDIT MEETING	CONTACTED DURING AUDIT	POST-AUDIT MEETING
Pearcy, M.	SPM/CCP		X	
Pearcy, S.	Records Manager/CCP	X	X	
Peters, K.	AKE/CCP	X	X	
Quintana, I.	SPM/CCP	X	X	X
Ramirez, M.	WCO-SPM/CCP		X	
Ray, W.	PC/NOD		X	
Redman, G.	VEE/ANL		X	
Reed, J.	DTC HPT/ANL		X	
Riley, W.	VEE/ANL		X	
Rock, C.	NOD Manager/ANL-FMS	X		X
Root, W.	VPM,VEE/CCP	X	X	X
Sensibaugh, M.	Projects Manager/CCP	X		
Turpin, G.	DTC Rigger/ANL		X	
Vaughn-Perry, V.	HSGS Chemist/CCP		X	
Walker, M.	QA Coordinator/CCP		X	
Watson, L.	AKE/CCP	X	X	

SUMMARY TABLE OF AUDIT RESULTS

Documents	Concern Classification				QA Evaluation		Technical
	CARs	CDAs	Obs	Rec	Adequacy	Implementation	Effectiveness
Activity							
ACCEPTABLE KNOWLEDGE				2	A	S	E
VISUAL EXAMINATION	1				A	S	E
VERIFICATION AND VALIDATION	1				A	S	E
HEADSPACE GAS					A	S	E
WIPP WASTE INFORMATION SYSTEM					A	S	E
DOSE-TO-CURIE					A	S	E
GRAVIMETRIC MEASUREMENT					I	I	I
TRAINING					A	S	E
RECORDS					A	S	E
QUALITY IMPROVEMENT					A	S	E
TOTALS	2			2			

Definitions

A = Adequate
 E = Effective
 S = Satisfactory
 I = Indeterminate
 M = Marginal

CAR = Corrective Action Report
 CDA = Corrected During the Audit
 Obs = Observation
 Rec = Recommendation

NA = Not Adequate
 NE = Not Effective
 NS = Not Satisfactory

LISTING OF AUDITED DOCUMENTS

No.	Procedure Number	DOCUMENT TITLE
1.	CCP-AK-ANLE-500	RH DEBRIS WASTE STREAM: AERHDM
2.	CCP-AK-ANLE-501	RH TRU DEBRIS WASTE From ANL-E
3.	CCP-AK-ANLE-502	RH Waste Stream: AERHDM
4.	CCP-AK-ANL-505C	Waste Fuel Examination Confirmation Test
5.	CCP-PO-001	CCP TRU Waste QAPjP
6.	CCP-PO-002	CCP TRU Waste Cert. Plan
7.	CCP-PO-005	CCP ConOps
8.	CCP-PO-006	CCP ConOps Matrix
9.	CCP-PO-008	CCP QA Interface with WTS QA Program
10.	CCP-PO-500	CCP/ANL RH-TRU Waste Interface Document
11.	CCP-PO-505	CCP RH-TRAMP
12.	CCP-QP-001	CCP Graded Approach
13.	CCP-QP-002	CCP Training and Qualification Plan
14.	CCP-QP-004	CCP Corrective Action Management
15.	CCP-QP-005	CCP TRU Nonconforming Item Reporting and Control
16.	CCP-QP-006	CCP Corrective Action Reporting And Control
17.	CCP-QP-008	CCP Records Management
18.	CCP-QP-010	CCP Document Preparation, Approval and Control
19.	CCP-QP-011	CCP Notebooks and Logbooks
20.	CCP-QP-014	CCP Notebooks and Logbooks
21.	CCP-QP-015	CCP Procurement
22.	CCP-QP-016	CCP Control Of Measuring, Testing and Data Collection Equip
23.	CCP-QP-017	CCP Identification and Control Of Items
24.	CCP-QP-018	CCP Management Assessment
25.	CCP-QP-019	CCP Quality Assurance Reporting to Management
26.	CCP-QP-021	CCP Surveillance Program
27.	CCP-QP-022	CCP Software Quality Assurance Plan
28.	CCP-QP-023	CCP Handling, Storage and Shipping

No.	Procedure Number	DOCUMENT TITLE
29.	CCP-QP-026	CCP Inspection Control
30.	CCP-QP-027	CCP Test Control
31.	CCP-QP-028	CCP Records Filing, Inventorying, Scheduling, and Dispositioning
32.	CCP-QP-030	CCP Written Practice for the Qualification of CCP Helium Leak
33.	CCP-TP-001	CCP Project Level Data V & V
34.	CCP-TP-002	CCP Reconciliation of DQOs and Reporting Characterization Data
35.	CCP-TP-003	CCP Data Analysis for S3000, S4000, and S5000 Char.
36.	CCP-TP-005	CCP AK Documentation
37.	CCP-TP-055	CCP Varian Porta-Test Leak Detector Operations
38.	CCP-TP-082	CCP Preparing and Handling Waste Containers for HSGS
39.	CCP-TP-083	CCP Gas Generation Testing
40.	CCP-TP-093	CCP Sampling of TRU Waste Containers
41.	CCP-TP-106	CCP HSGS BDR Preparation
42.	CCP-TP-162	CCP Random Selection of Containers for Solids and HSGS and Analysis
43.	CCP-TP-163	CCP Evaluation of Waste Packaging Records for VE of Records
44.	CCP-TP-500	CCP RH Waste VE
45.	CCP-TP-504	CCP D-T-C Survey Proc. for RH TRU Waste
46.	CCP-TP-505	CCP Removable Lid Canister Loading
47.	CCP-TP-506	CCP Preparation of the RH TRU Waste AK Characterization Reconciliation Report
48.	CCP-TP-507	CCP Shipping of RH TRU Waste
49.	CCP-TP-509	CCP RH TRU Container Tracking
50.	CCP-TP-530	CCP RH TRU Waste Certification and WWIS Data Entry
51.	DOE/WIPP-06-3346	WIPP Flam Gas Analysis
52.	WP 13-QA.03	Q A Independent Assessment Program
53.		

PROCESSES AND EQUIPMENT EVALUATED DURING AUDIT A-10-23

WIPP #	Process/Equipment Description	Applicable to the Following Waste Streams/Groups of Waste Streams	Currently Approved by NMED	Currently Approved by EPA
INITIAL APPROVAL PROCESSES OR EQUIPMENT				
The following were evaluated during CBFO Audit A-10-23 for initial approval				
TBD (Not Assigned)	Gravimetric or Dimensional Measurement CCP-TP-500, Remote-Handled Waste Visual Examination CCP-AK-ANL-505C, Fuel Examination Waste Confirmation Test	Debris (\$5000)	N/A	NO
PREVIOUSLY APPROVED PROCESSES OR EQUIPMENT				
The following were reevaluated during CBFO Audit A-10-23				
8RHVE1	Visual Examination CCP-TP-500, Remote-Handled Waste Visual Examination CCP-TP-163, CCP Standard Visual Examination of Records	Debris (\$5000)	YES	YES (Records only)
8RHVE2	Visual Examination of Newly Packaged RH Waste Drums CCP-TP-500, Remote-Handled Waste Visual Examination	Debris (\$5000)	YES	YES
Not Applicable	Acceptable Knowledge CCP-TP-005, CCP Acceptable Knowledge Documentation	Debris (\$5000)	YES	YES
8HSG2	Headspace Gas Sampling CCP-TP-093, CCP Sampling of TRU Waste Containers	Debris (\$5000)	YES	N/A
Not Applicable	Data verification and validation CCP-TP-001, CCP Project Level Data Validation and Verification CCP-TP-500, Remote-Handled Waste Visual Examination CCP-TP-504, CCP Dose-to-Curie Survey Procedure	Debris (\$5000)	YES	YES
8DTC1	Dose-to-Curie CCP-TP-504, CCP Dose-to-Curie Survey Procedure	Debris (\$5000)	N/A	YES
Not Applicable	Quality Assurance	N/A	N/A	YES
Not Applicable	WIPP Waste Information System (WWIS)/Waste Data System (WDS)	N/A	YES	YES