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 Carlsbad Field Office
 Carlsbad, New Mexico 88221


DATE: SEP 01 2011

REPLY TO
ATTN OF: CBFO:OQA:CGF:MAG:11-0687:UFC 2300.00

SUBJECT: Interim Audit Report A-11-20, Argonne National Laboratory Central Characterization Project TRU Waste Characterization and Certification

TO: Dale Dietzel, DOE-CH

The Carlsbad Field Office (CBFO) conducted Audit A-11-20 of the Argonne National Laboratory Central Characterization Project (ANL/CCP) Transuranic Waste Characterization and Certification on August 2-4, 2011. 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 Hazardous Waste Facility Permit, the Waste Acceptance Criteria, and the CBFO *Quality Assurance Program Document*. 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 concerning the attached report, please contact me at (575) 234-7548.


 Courtland G. Fesmire, P.E. *for*
 Quality Assurance Engineer

Attachment

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**U.S. DEPARTMENT OF ENERGY
CARLSBAD FIELD OFFICE**

INTERIM AUDIT REPORT

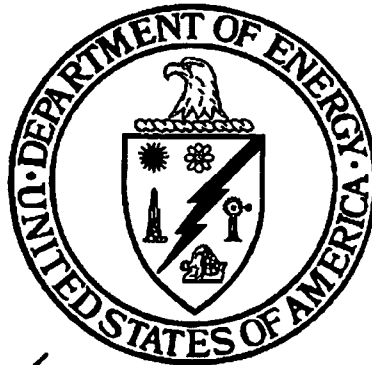
OF THE

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

CARLSBAD, NM, AND ARGONNE, IL

**AUDIT NUMBER A-11-20
August 2 – 4, 2011**

TRU WASTE CHARACTERIZATION AND CERTIFICATION



Prepared by: _____

Greg Knox
Greg Knox, CTAC
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Date: *24 AUG 2011*

Approved by: _____

Randy Unger
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Date: *31 Aug 11*

1.0 EXECUTIVE SUMMARY

Carlsbad Field Office (CBFO) Recertification Audit A-11-20 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). Characterization and certification activities of remote-handled (RH) Summary Category Group (SCG) S5000 debris waste were reviewed and evaluated for compliance to the applicable program requirements. The activities are performed consistent with the requirements described in the Waste Isolation Pilot Plant (WIPP) Hazardous Waste Facility Permit (HWFP), the *Remote-Handled TRU 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 2 – 4, 2011. 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. Concern # 1 was related to recommended changes and additions to Acceptable Knowledge (AK) documentation and was documented as a recommendation. Concern # 2 was identified in the Quality Assurance portion of the audit during the review of non-conformance reports (NCRs) and dealt with blank entries on the NCR form not being marked "N/A," as required by procedure. Further investigative actions showed the identified omissions to be isolated instances and they were corrected during the audit (CDA). Both issues are discussed in the associated sections in the report and described in sections 7.2 and 6.2, respectively.

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.

General Activities

The following general areas from Attachment B6, Section B6-3 of the HWFP were audited:

Results of previous audits
Changes in programs or operations
New programs or activities being implemented
Changes in key personnel

Technical Activities

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 Activities

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 TRU Waste Characterization Program Implementation Plan, DOE/WIPP-02-3214*
- *Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant, DOE/WIPP-02-3122*
- *CCP Transuranic Waste Characterization Quality Assurance Project Plan, CCP-PO-001*
- *CCP Transuranic Waste Certification Plan, CCP-PO-002*
- *CCP/ANL 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 (ATL), CBFO Technical Assistance Contractor (CTAC)
Cindi Castillo	ATL-in-Training, CTAC
Porf Martinez	Auditor, CTAC
Priscilla Martinez	Auditor, CTAC
Rick Castillo	Auditor, CTAC
Katie Martin	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/National TRU Program (NTP)
Ricardo Maestas	New Mexico Environment Department (NMED)
Steve Holmes	(NMED)
Connie Walker	(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 Argonne, IL, and Carlsbad, NM, on August 2, 2011. 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 Argonne, IL, and Carlsbad, NM, on August 4, 2011.

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 General Activities

5.2.1 Results of Previous Audits

Corrective actions from CBFO Corrective Action Report (CAR) 10-049, generated during CBFO recertification audit A-10-23, were evaluated. The audit team verified that sustained corrective action implementation has been maintained.

5.2.2 Changes in Programs and Operations

Interviews with the ANL/CCP management team indicated there were no significant changes in Programs or Operations since the previous CBFO recertification audit, A-10-23.

5.2.3 New Programs or Activities Being Implemented

Interviews with the ANL/CCP management team indicated there were no new programs or activities being implemented since the previous CBFO recertification audit, A-10-23.

5.2.4 Changes in Key Personnel

Interviews with the ANL/CCP management team indicated there were no significant changes in key personnel since the previous CBFO recertification audit, A-10-23.

5.3 Technical Activities

Each technical area audited is discussed in detail in the following sections. The method used to select objective evidence is discussed, the objective evidence used to assess compliance with the HWFP is cited briefly, and the result of the assessment is provided.

5.3.1 Acceptable Knowledge

The audit team addressed the HWFP Waste Analysis Plan (WAP) requirements listed on the C6-3 checklist along with portions of the C6-1 checklist. Objective evidence was reviewed and compiled to demonstrate compliance with the applicable requirements on these checklists. The audit team also reviewed the AK record in relation to specific and relevant requirements of the WCPIP, Rev. 2. The waste stream evaluated, designated as AERHDM, originally consisted of the forty-four 30-gallon drums for which ANL/CCP reviewed the VE videotapes of packaging done by ANL staff. Subsequently, the stream was expanded with the packaging of additional debris drums and fuel examination waste (FEW) from the Alpha Gamma Hot Cell Facility (AGHCF), which ANL/CCP personnel have characterized under a certified VE process. In addition, debris waste from the K Wing hot cells has been characterized during packaging and has been added to waste stream AERHDM. The audit team reviewed the projected waste volume for this stream contained in AK Source Document Summary C2025.

The audit team reviewed the latest revision to the AK Summary Report for this waste stream and a copy of the waste stream profile form (WSPF) and attachments. The team also examined numerous AK source documents to establish support for the conclusions noted in the AK Summary Report, particularly with respect to support for the waste stream chemicals and hazardous waste numbers listed in CCP-AK-ANLE-500, Table 5 for operations in both the AGHCF and K Wing hot cells. The audit team also examined the Acceptable Knowledge Documentation Checklist, CCP-TP-005, Attachment 1, the Acceptable Knowledge Source Document Reference List, CCP-TP-005, Attachment 4, the Hazardous Constituents Form, CCP-TP-005, Attachment 5, the Waste Form, Waste Material Parameters, Prohibited Items, and Packaging Form, CCP-TP-005, Attachment 6, along with the applicable justification memo for waste material parameter weight estimates, and the Waste Containers List, CCP-TP-005, Attachment 8. Examples of the resolution of AK discrepancies in the AK record, a WAP-compliant AK Accuracy Report, and the most recent internal surveillance were also collected and examined along with screenshots from the item description code database and a copy of the AK Tracking Spreadsheet.

Requisite training records for AK experts (AKEs) and site project managers (SPMs) were examined. The WAP-required traceability exercise was performed for five drums from the population of those that have been completely through the characterization and certification process, including three drums from three distinct HSG sampling lots. In addition to the HSG batch data reports (BDRs), the audit team reviewed the relevant VE BDRs and DTC data packages. For the AGHCF FEW waste containers, gravimetric BDRs and related calc packages were examined. The estimated waste material parameter weights for this stream and supporting documentation were reviewed. The reconciliation of characterization data with the AK record, including a review of the AK Characterization Checklists, was completed and deemed acceptable.

The audit team also examined the AK record and compiled objective evidence that demonstrates compliance with the requirements of the WCPIP as noted above. Documents reviewed included the WCPIP-compliant AK Accuracy Report and the Characterization Reconciliation Reports along with the examination of relevant AK source documents.

The Audit Team made four recommendations that included: 1) the submission of the WAP Compliance Tracking Table for new AK WAP requirements, completed and agreed upon during the audit; 2) the removal of the term "pyroprocessing" from the description of activities in the K Wing Cells since it is not applicable; 3) the clarification of the waste generation and waste packaging date for the K Wing Cells; and 4) the removal of an AK Source Document from CCP-AK-ANLE-500, Table 5, regarding the presence of benzene in the waste stream. Other AK Source Documents provide the necessary support. See Section 7.2.

The procedure reviews, field observations, and document reviews provided evidence that the applicable requirements for Acceptable Knowledge are adequately established

for compliance with upper-tier requirements, satisfactory in the implementation of these requirements, and effective in achieving the desired results.

5.3.2 Project-Level Validation and Verification

Project level data V&V reviews were performed to assess the data collected as a result of the applicable waste characterization implementing procedures. The ability of the ANL/CCP to characterize SCG S5000 RH debris waste was evaluated. The flow of data from the point of generation to inclusion in the WSPF for each characterization technique was reviewed to ensure that all applicable requirements were captured in the site operating procedures. The material in this section is also addressed in more detail in the applicable C6 checklists questions, where the specific procedures audited and the objective evidence reviewed is identified. Objective evidence was reviewed as part of this assessment and utilized in the completion of the WAP Checklist. The objective evidence included BDRs completed through the CCP SPM review for VE, HSG sampling and analysis, radiological characterization (DTC), and GDM. In addition, procedures were reviewed to ensure that ANL/CCP could adequately perform data reconciliation and properly prepare a WSPF.

Objective evidence was reviewed to make a determination of the adequacy of the SPM V&V procedures. The objective evidence provided included BDRs from each of the waste characterization activities.

Compliance with the characterization requirements was demonstrated through documentation and by demonstration of characterization activities. The project level data V&V process was evaluated by reviewing the following BDRs:

VE

RHANLVE110002	RHANLVE110007	ANLRHVE11008
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HGS and Analysis

ANHSGS100003	ECL10033G	ECL10033M
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DTC

ANLRHDTC11001	ANLRHDTC11002	ANLRHDTC11005
ANLRHDTC11006	ANLRHDTC11007	

GDM

RHANLDG11001	RHANLDG11004	RHANLDG11007
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Objective evidence was reviewed to ensure project level activities were adequately performed to support waste characterization. The audit team reviewed ANL/CCP quarterly data (from all quarters) for VE and HSG characterization processes.

The WSPF/characterization information summary (CIS) for SCG S5000 waste stream was reviewed. The waste stream is identified as AERHDM and is properly complete with CIS. The HSG random selection of containers for this waste stream was properly completed and various lots were reviewed including the most recent lot, number 4.

The ANL/CCP project level V&V process for VE was evaluated to determine the effectiveness of VE as a characterization method. Visual Examination BDRs RHANLVE110002, RHANLVE110007, and ANLRHVE11008 were assessed by the audit team.

ANL/CCP performs HSG sampling using SUMMA[®] canisters. Sampling BDR ANHSGS100003 for SCG S5000 debris waste was examined. During the audit analysis, BDRs for HSG (ECL10033G and ECL10033M) were evaluated and verified. Drum age criteria (DAC), sample chain-of-custody (COC), and shipment to the analytical laboratory were reviewed and determined to be compliant. The HSG analysis of the SUMMA[®] samples was reviewed by the team as well as the training and qualification of ANL/CCP V&V personnel. The analysis and reporting of the Field Reference Standard was completed by the SPM. Sample disposition was adequately performed and documented.

Project Level data V&V for DTC was evaluated by the audit team using BDRs ANLRHDTC11001, ANLRHDTC11002, ANLRHDTC11005, ANLRHDTC11006, and ANLRHDTC11007. The audit also verified the DGM BDRs for RHANLDG11001, RHANLDG11004, and RHANLDG11007.

The procedure reviews, field observations, and document reviews provided evidence that the applicable requirements for the project-level data V&V process are adequately established for compliance with upper-tier requirements, satisfactory in the implementation of these requirements, and effective in achieving the desired results.

5.3.3 Visual Examination

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

The audit team reviewed procedures CCP-TP-500, Rev. 11, *CCP Remote-Handled Waste Visual Examination*, 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. Procedure CCP-TP-163, Rev. 2, *CCP Evaluation of Waste Packaging Records for Visual Examination of Records*, was also evaluated. The review determined that the procedure adequately addresses upper-tier documents. ANL/CCP has not performed VE of records since the last audit, A-10-23.

ANL/CCP uses the two-operator method when performing VE characterization of newly generated waste. VE is performed by two qualified operators where the waste is visually examined and placed into containers. The audit team evaluated VE operations in the K Wing Hot Cell in building 205. The audit team observed VE operations for container number RW48261, containing waste from S5000 RH debris waste stream AERHDM. The audit team interviewed VE operators and VE experts. The audit team

also examined VE operational logbook RH-ANLE-VE-009 and verified logbook entries were logged correctly and reviewed by the vendor project manager (VPM), as required. At the time of the audit, VE operations were not being performed in the AGJCF in building 212.

The audit team examined the following RH VE BDRs generated 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 requirements for documenting VE activities, as stipulated in CCP-TP-500:

RHANLVE100009	RHANLVE100013	RHANLVE100016
RHANLVE110003	RHANLVE110007	ANLRHVE11009

The audit team examined training records for seven VE operators/Independent Technical Reviewers, and two SPMs and confirmed the appointment of two ANL/CCP VE Experts (VEEs). The audit team verified that VE operators, Independent Technical Reviewers, and SPMs were appropriately qualified as required.

The audit team evaluated corrective actions from CBFO CAR 10-049 identified during the previous ANL/CCP recertification audit, A-10-23, and verified continued corrective action implementation.

The procedure reviews, field observations, and document reviews provided evidence that the applicable requirements for characterizing RH S5000 debris waste using the Visual Examination Process is adequately established for compliance with upper-tier requirements, satisfactory in the implementation of these requirements, and effective in achieving the desired results.

5.3.4 Headspace Gas Sampling

HGS sampling was not being performed during the A-11-20 audit. As HSG sampling is performed sporadically due to the small volume of containers generated at this site, facilities for HSG are not maintained on a permanent basis. BDR ANHSGS100003 documents the only HSG sampling performed since audit A-10-23 and was examined by the team during this audit. This BDR of RH samples from SCG S5000 waste drums included: COC; calculation of DAC; temperature equilibration documentation; and sampling BDR preparation, review and storage activities performed by ANL/CCP.

Overall, the audit team concluded that the HSG sampling activities were adequate with respect to procedural compliance with requirements and satisfactory and effective in the implementation of those requirements

5.3.5 Dose-to-Curie

The audit team assessed the continuing adequacy, implementation, and effectiveness of the DTC method used by ANL/CCP, in accordance CCP-TP-504, to characterize

waste stream AERHDM. The audit team evaluated the actual measurement of the dose rate and the subsequent 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-10-23.

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:

- Proper development and documentation of the waste streams AK as documented in an Acceptable Knowledge Summary Report (CCP-AK-ANLE-500);
- Proper development, implementation, and products were produced from a Radiological Characterization Technical Report (CCP-AK-ANLE-501);
- Waste stream AERHDM is adequately addressed in a Waste Certification Plan for 40 CFR Part 194 Compliance (CCP-AK-ANLE-502);
- Development of average radionuclide ratios through sampling and/or modeling;
- 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;
- Calculation of the radionuclide activities and other derived radiological quantities and associated uncertainties;
- Any significant program changes or deviation since Audit A-10-23;
- Results of applying the DTC method to characterize waste since Audit A-10-23;
- Determination of the number of containers examined, completed BDRs and BDRs that had been through project-level review that were generated since Audit A-10-23;
- 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-10-23.

The source of the RH waste at the ANL was the examination of fuel pins and reactor materials in the AGHCF and the K Wing in the Chemical Technology Building. 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 in cases where the DTC methodology was applied.

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 remained in service in the Building 331 shell for the previous year since Audit A-10-23. In this apparatus, the exposure rate, attributed entirely to Cs-137, is measured four times at a distance of 1.0 meter from the waste containers. Auditors interviewed operations personnel about the set-up and calibration of the measurement apparatus for performing DTC and review calibration certification documentation as well as operations logbooks. 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.

The audit team interviewed DTC personnel, and examined electronic and paper copies of reports, records, and results. No concerns were identified during the audit of DTC.

Since Audit A-10-23, thirteen (13) BDRs (ANLRHDTTC10006, ANLRHDTTC10007, ANLRHDTTC10008, ANLRHDTTC10010, ANLRHDTTC10011, ANLRHDTTC10012, ANLRHDTTC10013, ANLRHDTTC10014, ANLRHDTTC11001, ANLRHDTTC11002, ANLRHDTTC11003, ANLRHDTTC11004, ANLRHDTTC11005) have been completed through project level as a result of applying the DTC method.

Overall, the audit team determined that DTC procedures and activities were adequate with respect to procedural compliance with requirements and satisfactory and effective in the implementation of those requirements.

5.3.6 Gravimetric and Dimensional Measurement

The audit team assessed the continuing adequacy, implementation, and effectiveness of the GDM method used by ANL/CCP to characterize waste stream AERHDM. The audit team evaluated the collection of dimensional or gravimetric data and the subsequent determination of required waste container data. For GDM, the length or weight of the RH waste is used in conjunction with a derived concentration of radiological properties expressed as a function of length or weight depending on which physical characteristic is being used. This method was introduced during Audit A-10-23 and determined to be indeterminate at the time. Subsequently, during Surveillance S-11-06, conducted March 8-9, 2011, the entire process for determining radiological

properties using the dimensional/gravimetric methodology was found to be adequate with respect to procedural compliance with requirements, and satisfactory and effective in the implementation of those requirements.

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:

- Proper development and documentation of the waste streams AK as documented in an Acceptable Knowledge Summary Report (CCP-AK-ANLE-500);
- Proper development, implementation, and products were produced from a Radiological Characterization Technical Report (CCP-AK-ANLE-501);
- Waste stream AERHDM is adequately addressed in a Waste Certification Plan for 40 CFR Part 194 Compliance (CCP-AK-ANLE-502);
- Development of average radionuclide ratios through sampling and/or modeling;
- Development of the relationship between the measured length or weight and the required radiological properties;
- Measurement of the length or weight of the waste;
- Calculation of the radionuclide activities and other derived radiological quantities and associated uncertainties;
- Any significant program changes or deviation since Audit A-10-23;
- Results of applying the GDM method to characterize waste since Audit A-10-23;
- Determination of the number of containers examined, completed BDRs and BDRs that had been through project-level review that were generated since Audit A-10-23;
- 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 GDM method since Audit A-10-23.

The source of the RH waste at the ANL was the examination of fuel pins and reactor materials in the AGHCF) and the K Wing in the Chemical Technology Building. 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 in cases where the DTC methodology was applied. In the case of the GDM approach, the same information sources and computer modeling were performed, but the results were expressed as a function of length or weight versus a function of Cs-137 dose rate.

To confirm the ORIGEN2.2 modeling results, radionuclide ratios were calculated for approximately 400 fuel pins that were also examined at the (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 GDM methodology combines measurements of length or weight that have been verified under the VE process with modeling results that express the desired radiological quantities as a function either of length or weight to yield the required radiologic quantities.

The audit team interviewed GDM personnel, and examined electronic and paper copies of reports, records, and results. No concerns were identified during the audit of the GDM method.

Since audit A-10-23, eight (8) BDRs (RHANLDG10001, RHANLDG11001, RHANLDG11002, RHANLDG11003, RHANLDG11004, RHANLDG11005, RHANLDG11006, RHANLDG11007) have been completed through project level review as a result of the application of the GDM methodology.

Overall, RH waste characterization using both the DTC and GDM methodologies, including all procedures and activities, was determined to be adequate with respect to procedural compliance with requirements and satisfactory and effective in the implementation of those requirements.

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

The audit team evaluated implementation of the CCP TRU Waste Certification and WWIS/WDS data entry procedure for data entry using the WWIS/WDS data entry spreadsheet. The evaluation included data population of the spreadsheet, review of data entry by a Waste Certification Assistant (WCA), and waste certification by the Waste Certification Official (WCO). Record reviews included CCP data spreadsheet reports, container information summaries, pages from BDRs showing analyses values, WWIS/WDS Container Data Reports, and submittals for WWIS review/approval.

The audit team reviewed a WWIS/WDS waste certification package for RH waste. The package reviewed was for Canister AE0089, which had three internal containers (1005, 1028, and 955). The RH WWIS/WDS waste certification package was for waste stream AERHDM.

No concerns were identified. Overall, the audit team determined that the WWIS/WDS activities were adequate with respect to procedural compliance with requirements and satisfactory and effective in the implementation of those requirements.

5.4 Quality Assurance Activities

5.4.1 Control of Nonconforming Items

The audit team interviewed the resident quality assurance engineer and selected all seven ANL NCRs generated since the last audit, A-10-23, to confirm that deficiencies are being appropriately documented and tracked through resolution as required. The following NCRs were reviewed during the audit:

- NCR-RHANL-0501-10
- NCR-RHANL-0502-10
- NCR-RHANL-0504-10
- NCR-RHANL-2343-11
- NCR-RHANL-0400-11
- NCR-RHANL-2254-11
- NCR-RHANL-2255-11

The audit team confirmed that there have been no NCRs which require reporting to the Permittee within the 7-day requirement at the time of the audit. All NCRs were verified as being managed and tracked in the CCP data center and on the 2010-2011 CCP NCR Logs. Further evaluations included reviews of the RHANL NCR Log Reconciliation Reports for 2010.

The audit team noted blank areas in block 19(d) of NCR-RHANL-0501-10, Rev. 0, and blocks 5 & 6 of NCR-RHANL-2343-11, Rev. 1. By procedural requirements, these blocks are to be marked "N/A" if no entries are made. ANL/CCP personnel made the corrections and the audit team deemed these to be isolated occurrences that were not quality-affecting. The audit team reviewed the changes for the associated NCRs and verified the corrections were made prior to the end of the audit. See CDA-1 in section 6.2.

The procedures reviewed and objective evidence assembled and evaluated during the audit provided evidence that the applicable requirements for control of nonconformances are adequately established for compliance with upper-tier requirements, satisfactory in the implementation of these requirements, and effective in achieving the desired results.

5.4.2 Personnel Qualification and Training

The audit team conducted interviews with responsible personnel and reviewed implementing procedure CCP-QP-002, Rev. 31, *CCP Training and Qualification Plan*, to determine the degree to which the procedure adequately addresses upper-tier requirements. Personnel training records associated with VE, DTC, AK, and site project management were examined to verify implementation of associated requirements and to verify that personnel performing characterization activities are appropriately qualified. Record reviews included qualification cards, appointment letters, and other associated

qualification documentation, including attendance sheets for required briefings on AK waste stream summary training for VE operators.

The procedures reviewed and objective evidence assembled and evaluated during the audit provided evidence that the applicable requirements for personnel training and qualification are adequately established for compliance with upper-tier requirements, satisfactory in the implementation of these requirements, and effective in achieving the desired results.

5.4.3 QA Records

The audit team conducted interviews and reviewed implementing procedures relative to the control and administration of QA records to determine the degree to which the procedures adequately address upper-tier requirements. The procedure review included CCP-PO-001, Rev. 20, *CCP Transuranic Waste Characterization Quality Assurance Project Plan*; CCP-QP-008, Rev. 18, *CCP Records Management*; and CCP-QP-028, Rev. 12, *CCP Records Filing, Inventorying, Scheduling, and Dispositioning*. Control of QA records was verified through review of the CCP RH (All Sites) RIDS dated 2/21/11. No concerns were identified.

Additional ANL/CCP records retrieved and reviewed during the audit included three BDRs (ANLRHDTTC11006, ANLRHDTTC11007, ANLRHDTTC11004), Logbook # RH-ANLE-DTC-005, completed Lessons Learned required readings, Lot 4 HSG Data Summary Report for Waste Stream AERDNM, and radiological survey RH-RTU-DTC Survey Log for 331 Shell.

The procedures reviewed and objective evidence assembled and evaluated during the audit provided evidence that the applicable requirements for QA records are adequately established for compliance with upper-tier requirements, satisfactory in the implementation of these requirements, and effective in achieving the desired results.

5.4.4 Sample Control

The audit team reviewed documentation supporting adequate control of HSG samples provided in the sampling BDR ANHSGS100003. Although the team was not able to be present at the sampling, control and documentation of the sampling event is adequately maintained. Control is documented on the COC and supported through transportation to the Idaho National Laboratory. A temperature log was provided in the BDR and shows the temperature was properly maintained until received by the lab facility.

Overall, the audit team concluded that sample control processes were adequate with respect to procedural compliance with requirements and satisfactory and effective in the implementation of those requirements.

5.4.5 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 data-generation-level container management database and by field observations of RH containers in building 331, Radioactive Waste Storage Facility. RH containers are stored in shielded areas on level four; RH containers that have "open" NCRs are physically segregated in a shielded area on level 2.

No concerns were identified during the audit. The procedure reviews, field observations, and document reviews provided evidence that the applicable requirements for container management are adequately established for compliance with upper-tier requirements, satisfactory in the implementation of these requirements, and effective in achieving the desired results.

6.0 SUMMARY OF DEFICIENCIES

6.1 Corrective Action Reports

During the audit, the audit team may identify conditions adverse to quality and document such conditions on 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.

There were no CARs identified during A-11-20.

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 (CDA).

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:

CDA – 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 was one CDA issue identified and documented during the audit.

CDA-1

During review of NCRs generated since Audit A-10-23, the following was noted:

- a) Block 19(d) of CCP-QP-005, Rev. 18, attachment 1, was left blank and “N/A” was not entered on NCR-RHANL-0501-10, Rev. 0. The NCR form reads: “as required, N/A if left blank.”
- b) Blocks #5 & #6 of CCP-QP-005, Rev. 18, attachment 1, were left blank and “N/A” was not entered on NCR-RHANL-2343-11, Rev. 1.

CCP-QP-005, Rev. 20, paragraphs 4.1.1[C], 4.1.1[C.1], and 4.4.1.5 require “N/A” to be entered if these blocks are not applicable.

Corrections were made to the discrepant forms, the total population reviewed, and the team deemed the corrections to be non-quality-affecting, isolated occurrences. The team also verified that corrections were completed prior to the end of the audit.

7.0 SUMMARY OF OBSERVATIONS AND 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 member, in conjunction with the ATL, evaluates these conditions and classifies them as Observations or Recommendations using the following definitions.

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

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.

7.1 Observations

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

7.2 Recommendations

The audit team offers the following recommendations to ANL/CCP. These comments identify areas that could be modified or revised to: a) provide clarity, or b) address recent permit modifications.

Recommendation 1

It is recommended that freeze file changes as applicable be made to the AK Summary CCP-AK-ANLE-500 R6 for the RH waste stream AERHDM examined during this audit to address the permit modifications enacted on 12/30/10 dealing with Acceptable Knowledge. These changes are noted on the NMED WAP Compliance Matrix and will be attached to the AK Summary submitted with the final report to the State consistent with the agreement made between NMED and CBFO. The changes were discussed with and concurred by the audit participants.

Recommendation 2

It is recommended that references to "pyroprocessing" in the AK Summary Report with respect to K Wing activities be removed since there is no description in the AK record of the process or process constituents. The AK record does indicate that the process predates the period of waste generation in this facility.

Recommendation 3

It is recommended that text be added to sections 4.2.1 *Types and Quantity of TRU Waste Generated* and 5.2 *Waste Stream Volume and Period of Generation* of the AK Summary to clarify the period of waste generation and the period of waste packaging.

Recommendation 4

It is recommended that AK Source Document C147 be removed from Table 5 of CCP-AK-ANLE-500, Rev. 6, as supporting documentation for the presence of benzene in this waste stream. This source document does not provide justification for presence of benzene. Other AK Source Documents do provide the required justification.

8.0 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-11-20

PERSONNEL CONTACTED DURING AUDIT A-11-20				
NAME	TITLE/ORG	PRE-AUDIT MEETING	CONTACTED DURING AUDIT	POST-AUDIT MEETING
Billett, M.	Training Coordinator/CCP		X	
Bond, E.	VEO/CCP		X	
Callahan, L.	Project Specialist/FMS/NOD		X	
Dietzel, D.	FPD/DOE ASO	X		X
Doherty, M.	AKE/CCP		X	
Fisher, A.J.	Sr. Tech. Adv. Training/CCP			X
Gomez, C.	QA Specialist/CCP	X	X	
Griffith, M.	DTC/ CCP	X	X	
Hodge, D.	205, K-Wing CAM/ANL	X		
Kirkes, C.	WCA/WCO/CCP		X	
Martin, R.	Record Analyst/CCP		X	
Nelson, L.	RH SPM/CCP	X	X	
Pancake, D.	Proj. Mgr./ANL	X	X	
Patee, S.	VEE/CCP		X	X
Pearcy, S.	Records Mgr./CCP	X	X	
Peters, K.	AKE/CCP		X	
Quintana, I.	PM/CCP	X	X	X
Ray, W.	Project Specialist/ANL		X	
Redman, G.	VEO/CCP		X	
Rock, C.	Nuc. Ops./ANL	X		
Root, W.	VPM/CCP	X	X	
Wade, L.	QA/CCP	X	X	
Watson, L.	AKE/CCP		X	

SUMMARY TABLE OF AUDIT RESULTS

Documents	Concern Classification				QA Evaluation		Technical
	CARs	CDAs	Obs	Rec	Adequacy	Implementation	Effectiveness
Activity							
ACCEPTABLE KNOWLEDGE				X	A	S	E
VISUAL EXAMINATION					A	S	E
VERIFICATION AND VALIDATION					A	S	E
HEADSPACE GAS					A	S	E
WIPP WASTE INFORMATION SYSTEM					A	S	E
DOSE-TO-CURIE					A	S	E
GRAVIMETRIC MEASUREMENT					A	S	E
TRAINING					A	S	E
RECORDS					A	S	E
QUALITY IMPROVEMENT		X			A	S	E
TOTALS		1		4			

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	ANL Summary Report for AERHDM
2.	CCP-AK-ANLE-501	RH TRU Rad Char Tech Report for AERHDM
3.	CCP-AK-ANLE-502	Certification Plan for AERHDM
4.	CCP-AK-ANL-505C	Fuel Examination Waste Confirmation Test for AERHDM
5.	CCP-PO-001	CCP TRU Waste Characterization QAPJP
6.	CCP-PO-002	CCP Transuranic Waste Certification Plan
7.	CCP-PO-005	CCP Conduct of Operations
8.	CCP-PO-006	CCP Conduct of Operations Matrix
9.	CCP-PO-008	CCP Quality Assurance Interface With WTS QA Program
10.	CCP-PO-500	CCP/ANL RH TRU Waste Interface Document
11.	CCP-PO-505	CCP Remote-Handled Transuranic Waste Authorized Methods For Payload Control
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-014	CCP Trend Analysis and Reporting
20.	CCP-QP-015	CCP Procurement
21.	CCP-QP-016	CCP Control of Measuring and Testing Equipment
22.	CCP-QP-017	CCP Identification and Control of Items
23.	CCP-QP-018	CCP Management Assessment
24.	CCP-QP-019	CCP Quality Assurance Reporting to Management
25.	CCP-QP-021	CCP Surveillance Program
26.	CCP-QP-022	CCP Software Quality Assurance Plan
27.	CCP-QP-023	CCP Handling, Storage and Shipping
28.	CCP-QP-026	CCP Inspection Control

LISTING OF AUDITED DOCUMENTS

No.	Procedure Number	DOCUMENT TITLE
29.	CCP-QP-027	CCP Test Control
30.	CCP-QP-028	CCP Records Filing, Inventorying, Scheduling, and Dispositioning
31.	CCP-QP-030	CCP Written Practice for the Qualification of CCP Helium Leak Detection Personnel
32.	CCP-TP-001	CCP Project Level Data Validation and Verification
33.	CCP-TP-002	CCP Reconciliation of DQOs and Reporting Characterization Data
34.	CCP-TP-003	CCP Data Analysis for S3000, S4000, and S5000 Characterization
35.	CCP-TP-005	CCP Acceptable Knowledge Documentation
36.	CCP-TP-055	CCP Varian Porta-Test Leak Detector Operations
37.	CCP-TP-082	CCP Preparing and Handling Waste Containers for HSGS
38.	CCP-TP-093	CCP Sampling of TRU Waste Containers
39.	CCP-TP-106	CCP HSGS BDR Preparation
40.	CCP-TP-162	CCP Random Selection of Containers for Solids and HSGS and Analysis
41.	CCP-TP-163	CCP Evaluation of Waste Packaging Records for VE of Records
42.	CCP-TP-500	CCP RH Waste VE
43.	CCP-TP-504	CCP D-T-C Survey Proc. for RH TRU Waste
44.	CCP-TP-505	CCP Removable Lid Canister Loading
45.	CCP-TP-506	CCP Preparation of the RH TRU Waste AK Characterization Reconciliation Report
46.	CCP-TP-507	CCP Shipping of RH TRU Waste
47.	CCP-TP-509	CCP RH TRU Container Tracking
48.	CCP-TP-512	CCP RH Waste Sampling
49.	CCP-TP-513	CCP Procedure for Documentation Package For Dimensional or Gravimetric Measurements for Radiological Characterization of RH TRU Waste
50.	CCP-TP-530	CCP RH TRU Waste Certification and WWIS/WDS Data Entry
51.	WP 13-QA.03	Q A Independent Assessment Program

PROCESSES AND EQUIPMENT EVALUATED DURING CBFO AUDIT A-11-20

WIPP #	Process/Equipment Description	Applicable to the Following Waste Streams/Groups of Waste Streams	Currently Approved by NMED	Currently Approved by EPA
PREVIOUSLY APPROVED PROCESSES OR EQUIPMENT				
The following were evaluated during CBFO Audit A-11-20				
8RHVE1	Visual Examination CCP-TP-500, Remote-Handled Waste Visual Examination CCP-TP-163, CCP Standard Visual Examination of Records	Debris (S5000)	YES	YES (Records only)
8RHVE2	Visual Examination of Newly Packaged RH Waste Drums CCP-TP-500, Remote-Handled Waste Visual Examination	Debris (S5000)	YES	YES
Not Applicable	Acceptable Knowledge CCP-TP-005, CCP Acceptable Knowledge Documentation	Debris (S5000)	YES	YES
Not Applicable	Headspace Gas Sampling CCP-TP-093, CCP Sampling of TRU Waste Containers	Debris (S5000)	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 (S5000)	YES	YES
8RHGM1	Gravimetric or Dimensional Measurement CCP-TP-500, Remote-Handled Waste Visual Examination CCP-AK-ANL-505C, Fuel Examination Waste Confirmation Test	Debris (S5000)	N/A	YES
8DTC1	Dose-to-Curie CCP-TP-504, CCP Dose-to-Curie Survey Procedure	Debris (S5000)	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