DATE: July 23, 2008

REPLY TO ATTN OF: CBFO:QA:MPN:KBS:08-0396:UFC 2300

SUBJECT: Interim Audit Report A-08-12 Oak Ridge National Laboratory Characterization of Remote Handled Transuranic Waste

TO: William (Bill) McMillan

The Carlsbad Field Office (CBFO) conducted Audit A-08-12 of the Oak Ridge National Laboratory (ORNL) for remote-handled waste characterization activities. The audit was conducted June 30 through July 2, 2008. The CBFO interim audit report is attached.

The audit team concluded that the ORNL and Central Characterization Project (CCP) technical and quality assurance programs for these activities were adequate in accordance with the WIPP Hazardous Waste Facility Permit, the CBFO Quality Assurance Program Document, the WIPP Waste Acceptance Criteria, and the RH TRU Waste Characterization Program Implementation Plan. The audit team determined that the ORNL/CCP procedures were being satisfactorily implemented and the evaluated processes were effective.

As a result of the audit, no CBFO corrective action reports were issued. Two minor conditions adverse to quality, isolated in nature, were corrected during the audit. The audit team identified no Observations during the audit and offered no Recommendations to ORNL/CCP management.

If you have any questions or comments, please contact me at (575) 234-7483.

Martin P. Navarrete
Senior Quality Assurance Specialist

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WIPP Operating Record, MS: 452-09
CBFO QA File
CBFO M&RC
*ED denotes electronic distribution
U.S. DEPARTMENT OF ENERGY
CARLSBAD FIELD OFFICE

INTERIM AUDIT REPORT

OF THE

OAK RIDGE NATIONAL LABORATORY (ORNL)
UTILIZING THE
CENTRAL CHARACTERIZATION PROJECT (CCP)

OAK RIDGE, TENNESSEE

AUDIT NUMBER A-08-12

JUNE 30 – JULY 2, 2008

INTERIM AUDIT REPORT OF WASTE CHARACTERIZATION IN ACCORDANCE WITH THE HAZARDOUS WASTE FACILITY PERMIT

Prepared by: [Signature]
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Date: 7/17/08

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Date: 7/22/08
1.0 EXECUTIVE SUMMARY

Carlsbad Field Office (CBFO) Certification Audit A-08-12 was conducted to evaluate the adequacy, implementation, and effectiveness of Oak Ridge National Laboratory (ORNL) transuranic (TRU) waste characterization activities performed for remote-handled (RH) Summary Category Group (SCG) S5000 debris waste by the Washington TRU Solutions (WTS) Central Characterization Project (CCP). Activities were evaluated relative to the requirements of the Waste Isolation Pilot Plant (WIPP) Hazardous Waste Facility Permit (HWFP), the CBFO Quality Assurance Program Document (QAPD), the Waste Acceptance Criteria (WAC) for the Waste Isolation Pilot Plant, and the RH TRU Waste Characterization Program Implementation Plan (WCPIP).

The audit was performed at ORNL June 30 through July 2, 2008. The audit team concluded that the overall adequacy of the ORNL/CCP technical and Quality Assurance (QA) programs, as applicable to the audited activities, were satisfactory in meeting requirements. The audit team concluded that overall, the defined QA and technical programs for SCG S5000 RH debris waste were being satisfactorily implemented in accordance with CCP-PO-001, CCR Transuranic Waste Quality Assurance Characterization Project Plan (QAPP), and its implementing procedures, and that the processes were effective, with one exception.

The QA equivalency for demonstrating that measurements conducted during the time frame of 1995 to 1996 (used in dose-to-curie (DTC) calculations) were collected under a QA program lacked sufficient documentation. The audit team concluded that for QA equivalency, ORNL/CCP upper-tier requirements were adequate, and marginally implemented, and their effectiveness was indeterminate. A follow-up surveillance will be conducted prior to waste shipment. The audit team also concluded that the ORNL/CCP QA program activities that demonstrate compliance with the HWFP Table B6-1, are being satisfactorily implemented and are effective.

The audit team identified no conditions adverse to quality resulting in the issuance of a corrective action report (CAR).

Two deficiencies, isolated in nature and requiring only remedial corrective action, were identified and corrected during the audit (CDA). The first CDA was identified in the area of Acceptable Knowledge (AK). Assignments of waste codes identified in the AK record (from AK Source document C078) were not justified for inclusion in the specific waste stream. ORNL/CCP documented changes in the AK record on discrepancy report DR602. Changes were verified complete prior to the end of the audit. See CDA-1 section 6.2 for details.

While verifying required contents for certificates of calibration for instruments used in DTC measurements, complete records could not be produced by ORNL. Complete documentation was obtained from CCP in Carlsbad and verified prior to the end of the audit. See CDA-2 in section 6.2 for details.
No Observations were identified during the audit, and no Recommendations are being offered for management consideration.

2.0 SCOPE AND PURPOSE

2.1 Scope

The audit team evaluated the adequacy, implementation, and effectiveness of the ORNL/CCP TRU waste characterization activities for SCG S5000 RH debris waste stream OR-REDC-RH-HET. The following elements were evaluated:

Quality Assurance

- Personnel Qualification and Training
- Nonconformances
- Records
- QA Equivalency (for DTC calculations)

Technical

- Data Validation & Verification (V&V)
- Acceptable Knowledge (AK)
- Visual Examination (VE)
- Radiological characterization (DTC)
- Waste Certification (e.g., Waste Stream Profile Form)
- WIPP Waste Information System (WWIS)

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

- Hazardous Waste Facility Permit (HWFP) Waste Isolation Pilot Plant EPA No. NM4890139088-TSDF by the New Mexico Environment Department
- CBFO Quality Assurance Program Document (QAPD); DOE/CBFO-94-1012
- Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant, DOE/WIPP-02-3122
- RH TRU Waste Characterization Program Implementation Plan (WCPIP), DOE/WIPP-02-3214
- CCP Transuranic Waste Quality Assurance Characterization Project Plan (QAPjP), CCP-PO-001
- CCP Transuranic Waste Certification Plan, CCP-PO-002

Related technical and QA implementing procedures
2.2 Purpose

Audit A-08-12 was conducted to assess the level of compliance of ORNL/CCP waste characterization and certification activities for SCG S5000 RH debris waste stream OR-RED-C-RH-HET, as related to the requirements of the HWFP.

3.0 AUDIT TEAM AND OBSERVERS

AUDITORS/TECHNICAL SPECIALISTS

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<thead>
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<td>Pecos Management</td>
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4.0 AUDIT PARTICIPANTS

The individuals at ORNL/CCP who were contacted during the audit are identified in Attachment 1. A pre-audit meeting was held in the conference room in Trailer 7880P at the TRU Waste Processing Center in Oak Ridge, Tennessee, on June 30, 2008. Daily meetings were held with ORNL/CCP management and staff to discuss the previous day’s issues and potential deficiencies. The audit was concluded with a post-audit meeting held in the conference room in Trailer 7880P at the TRU Waste Processing Center in Oak Ridge, Tennessee, on July 2, 2008.
5.0 SUMMARY OF AUDIT RESULTS

5.1 Program Adequacy, Implementation, and Effectiveness

This audit was performed to assess the ability of ORNL/CCP to characterize RH waste from SCG S5000 debris waste to the requirements specified in the WIPP WAP, WIPP WAC, and RH TRU WCP/IP. The characterization methods assessed were AK, VE, and Radiological Characterization (DTC). Other processes evaluated were project-level data review and validation, and WWIS data entry. Data quality objective (DQO) reconciliation and the preparation of waste stream profile forms (WSPFs) for RH waste were not available during the audit, although the process was evaluated during ORNL/CCP Audit A-08-04.

The audit team concluded that the applicable ORNL/CCP TRU waste characterization activities, as described in the associated ORNL/CCP implementing procedures, are satisfactory in meeting the requirements of the HWFP. Attachment 2 contains a Summary Table of Audit Results. Attachment 3 contains a table of audited documents evaluated during the audit. Attachment 4 is a list of processes and equipment evaluated during the audit. Audit activities are described below.

5.2 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.

5.2.1 Table B6-1, WAP Checklist

The audit was performed to assess ORNL/CCP's ability to manage and perform TRU waste characterization and certification activities for SCG S5000 RH debris waste stream OR-REDC-RH-HET. The B6-1 WAP checklist addresses general program requirements from an overall management perspective. The general requirements checklist addresses both technical requirements and quality assurance programmatic requirements that, when collectively implemented, ensure effective overall management of TRU waste characterization and certification activities. Requirements are integrated into controlled documents that will ensure the waste characterization strategy as defined in the WAP is accomplished and documented in accordance with controlled processes and procedures.

The audit team evaluated both the QA program aspects of the B6-1 checklist and the technical activities defined in the remaining B6 checklists. B6-1 checklist items related to QA program implementation were evaluated by the audit team. The following QA activities, including those required by the B6-1 checklist were evaluated:

- **Personnel Qualification and Training:** The audit team evaluated objective evidence of training of CCP personnel who perform characterization activities of ORNL RH waste containers. A sample of personnel training qualification card
files was evaluated for Site Project Manager (SPM), Waste Certification Official (WCO), Waste Certification Associate (WCA), AK Expert (AKE), DTC Operations, DTC Independent Technical Reviewer (ITR), Headspace Gas (HGAS) Sample Operations and HGAS ITR positions. The audit team determined that personnel are trained in accordance with procedure and receive WAP, WAC, nonconformance reporting, and site-specific RH training.

Qualification cards adequately document required reading, on-the-job training, and dated verification and approval signatures. Documents indicate completion of contact-handled (CH) and RH waste training for specific host facilities. The audit team determined that Personnel Qualification and Training as related to the HWFP were adequate, satisfactorily implemented, and effective. No concerns related to personnel qualification and training were identified.

- **QA Records:** The audit team evaluated the quality assurance record program for the ORNL host facility documenting characterization of RH waste containers. CCP has completed a Records Inventory and Disposition Schedule (RIDS) for the ORNL RH host facility and project. Lifetime and non-permanent record retention periods are adequately identified within the RIDS. The audit team evaluated CCP Records Inventory Worksheets. These CCP procedure attachments adequately document identification and classification of all items placed on the RIDS.

ORNL host facility records personnel were interviewed regarding control of in-process records and transmittal of completed records to the CCP project office location. The audit team determined that paper and electronic media records are adequately controlled, inventoried, and transferred. The audit team interviewed other host facility operations personnel to verify that in-process records are controlled and protected in accordance with records procedures. The sample of records evaluated during the audit provided evidence that corrections and amendments to records were performed in accordance with procedure. The audit team determined that the management of QA Records as related to the HWFP was adequate, satisfactorily implemented, and effective. No concerns related to QA Records were identified.

- **Nonconformance:** The audit team evaluated objective evidence of implementation of the nonconformance reporting (NCR) program associated with ORNL/CCP RH activities. There have been three NCRs generated to date at ORNL/CCP related to the RH program. Status of NCRs is tracked using the NCR module of the CCP Data Tracking System (DTS). The audit team determined that management of nonconformances as related to the HWFP was adequate, satisfactorily implemented, and effective. No concerns related to Nonconformance were identified.

- **WWIS:** The audit team evaluated objective evidence of certification of ORNL RH containers and witnessed a demonstration of WWIS data entry. The demonstration included implementation of procedure steps related to selection of containers for RH TRU 72-B waste canister overpack data entry. WWIS data
are entered manually into ORNL/CCP RH spreadsheets from record copies of approved characterization batch data reports (BDRs). Spreadsheets are manually reviewed and approved, and then data are electronically transferred into WWIS characterization or certification modules using standard utilities within WWIS. Data used for audit demonstration purposes consisted of actual DTC radioisotope data for the containers and simulated data for remaining required data fields. Headspace gas for the demonstration containers has been sampled, but analyses results have not been published. The data demonstration was performed within the test module of the WWIS program, which is adequate to simulate entry into the characterization and/or certification modules of WWIS. The audit team determined that the scope of data entered into the CCP WWIS ORNL RH data spreadsheet is adequate to satisfy requirements for RH characterization and certification. Subsequent data transfer into WWIS satisfies requirements to present data in the format acceptable to WWIS.

Training records were evaluated for CCP personnel entering ORNL RH container data into WWIS. There are currently two WCO personnel qualified to perform ORNL RH data entry and certification activities. WCAs are being qualified to review spreadsheet and WWIS data entry activities. CCP personnel have requested and been granted access to WWIS, including permission for use of the ORNL RH site identification code.

The audit team determined that CCP personnel are capable of identifying required data items, and entering and reviewing actual and simulated RH container data from record sources into the ORNL CCP RH data spreadsheet, and transferring data to the WWIS test module. The audit team also determined that CCP personnel are capable of selecting containers for RH TRU 72-B waste canister overpack data entry within the WWIS certification module. These capabilities should be adequate to allow identification of data items and data entry and transfer into characterization and certification modules, once actual RH container data are generated. The ORNL/CCP WWIS activities were found to be adequate with respect to procedural compliance with requirements, satisfactorily implemented, and effective. No concerns related to WWIS were identified.

- **Software Quality Assurance:** The audit team evaluated documentation of software quality assurance activities for applications supporting characterization of RH waste at the ORNL host facility. The software inventory listing indicates that spreadsheet type applications are implemented for DTC and WWIS data entry activities. There are two DTC spreadsheet applications allowing radioisotope calculations of waste containers generated from casks based on packaging time frames of those casks. The WWIS spreadsheet is a clone of a similar spreadsheet in use for RH activities at the Idaho National Laboratory (INL) host facility. Software quality assurance life-cycle and testing documentation for spreadsheets contains adequate detail for this classification of software application. Spreadsheets are implemented, reviewed, tested, and approved in accordance with procedure. The WWIS spreadsheet application
was in draft status at the time of the audit, with testing and life-cycle
documentation in the review and approval process.

Other software applications are implemented at the project office-level for
tracking of nonconformances, software error/problem reports, and software
change orders.

Problem reporting and change control documentation for spreadsheet
applications was evaluated and determined to be adequate and in accordance
with procedure. Project-level tracking applications have been in-service for other
host facility locations and were demonstrated during the audit. The audit team
determined that project-level tracing software functionality is adequate for
tracking of RH activities at the ORNL host facility location.

The audit team determined that inventory, problem reporting, change control,
testing, and life-cycle documentation software quality assurance activities are
adequate and performed in accordance with CCP procedures for RH activities at
the ORNL host facility. The ORNL/CCP Software QA activities were found to be
adequate with respect to procedural compliance with requirements, satisfactorily
implemented, and effective. No concerns related to Software Quality Assurance
were identified.

- **Transportation:** The audit team determined that RH transportation activities are
  not yet implemented at the ORNL host facility. CCP waste certification
  personnel interviewed during the audit indicated that transportation activities will
  be performed at a later date using CCP personnel currently performing
  transportation activities at the INL host facility. There were no CCP
  transportation personnel available for interview at the ORNL host facility during
  the audit.

- **QA Equivalency:** The audit team reviewed the documentation that had been
  assembled by ORNL/CCP to support a determination that the radiochemical
  analysis of swipes and leach samples from hot-cell waste performed by ORNL in
  1995 - 1996 had been performed under a QA program equivalent in effect to the
  current applicable requirements of the CBFO QAPD. This method is an
  allowable method of qualifying AK information per section 4.3.4 of DOE/WIPP-
  02-3214. The radiochemical analytical data were used in the development of
  isotopic ratios used in the DTC method applied to ORNL waste.

The ORNL/CCP had prepared a CBFO QAPD procedure matrix (CCP-AK-
ORNL-503) that identified the ORNL procedures that were purported to be
applicable to the activities, cross referenced to the QAPD requirements. The
CBFO QAPD is based upon ASME NQA-1-1989 edition, ASME NQA-2a-1990
edition (excluding Section 2.1 (b) and (c) and Section 17.1). This matrix was
prepared in accordance with procedure CCP-QP-036, *CCP Qualification of*

The procedure matrix identified three QA plans as applicable to the analytical work:

- QAP-X-94-CASD-001, Revs. 0 and 1, *Chemical and Analytical Sciences Division Quality Assurance Plan*

- WMRA-WMP-601, Rev. 0, *Oak Ridge National Laboratory Quality Assurance Project Plan for the Transuranic Waste Characterization Program*

- ORNL/TM-10322, Rev. 1, *Oak Ridge National Laboratory Transuranic Waste Certification Program*

The ORNL/CCP relies heavily upon ORNL/TM-10322, which was written specifically to address the WIPP requirement in existence at the time, circa 1995. This document was referenced exclusively in Appendix A to CCP-AK-ORNL-503. ORNL/CCP was not able to document that the laboratory that performed the analysis used in the DTC modeling actually worked to this certification plan.

The audit team requested documentation to demonstrate implementation of a QA program by the laboratory. The ORNL/CCP was unable to produce the analytical data reports for the swipe and leach samples analyzed by the laboratory. The method procedures provided by ORNL/CCP dated from the mid-1980s. Because the audit team was unable to review the analytical data reports, they were unable to tie the data to a specific laboratory, and therefore to a specific QA program. The reliance on ORNL/TM-10322 was unsupported by the record assembled by ORNL/CCP (i.e., there was no evidence presented to show the analytical laboratory worked to this QA program). In fact, the version of ORNL/TM-10322 states that it, "...describes the program for certification of newly generated (NG) contact-handled transuranic waste." The audit team deemed it unlikely that this was the QA program used by the analytical laboratory for its day-to-day activities.

The audit team concluded that the ORNL/CCP procedure for documenting QA equivalency was adequate, the process implementation for the swipe and leach radiochemical data was marginal, and the effectiveness was indeterminate.

- **Container Management:** The audit team reviewed implementation of CCP-TP-509, *Remote-Handled Transuranic Container Tracking*. The status of all RH containers processed by ORNL/CCP at the time of the audit was verified by reviewing the Data Generation Level Container Management database. The status of all open NCRs issued on RH containers at ORNL by CCP was verified by reviewing the NCR database.
The audit team concluded that RH container management performed by ORNL/CCP was adequate, satisfactorily implemented, and effective.

Technical activities that were evaluated, including both characterization and certification, included the following: data generation-level and project-level V&V, AK, VE, and Radiological Characterization (DTC). Objective evidence was selected and reviewed to evaluate the implementation of the associated characterization activities. BDRs, sampling records, and training documentation for personnel were included in the evaluation. The audit included direct observation of actual waste characterization activities (such as VE and WWIS data entry). Each characterization process involves:

- Collecting raw data
- Collecting quality assurance/quality control (QA/QC) samples or information
- Reducing the data to a useable format, including a standard report
- Review of the report by the data generation facility and the site project office
- Comparing the data against program DQOs
- Reporting the final waste characterization information to WIPP

The flow of data for each characterization technique was reviewed to ensure that all applicable requirements were captured in the site operating procedures. Specific procedures audited and the objective evidence reviewed are described in the following sections.

Objective evidence was reviewed to ensure project-level activities were adequately performed to support waste characterization. BDRs were evaluated based on project-level requirements for the RH S5000 VE activities. The 2008 quarterly repeat data generation-level reviews were not evaluated because all BDRs were completed during the current quarter. There has not been a WSPF and Characterization Information Summary submitted for the ORNL S5000 waste stream at this time.

Headspace Gas Sampling and Analysis were not within the scope of this audit, as these were validated during the A-08-04 CH certification audit for ORNL.

The project-level data V&V process was evaluated by reviewing the following BDRs:

RHORVE080002
RHORVE080003
RHORVE080004

Overall, project-level activities were determined to be adequate, satisfactorily implemented, and effective.
5.2.2 Table B6-2, Solids and Soils/Gravel Sampling Checklist

This audit was performed to assess the ability of ORNL/CCP to characterize the SCG S5000 debris waste stream.

ORNL/CCP is not characterizing any S4000 soils/gravel or S3000 homogeneous solids waste streams at this time.

5.2.3 Table B6-3, Acceptable Knowledge

The audit team reviewed the AK record for ORNL/CCP RH TRU debris stream OR-REDC-RH-HET. This certification audit was based upon the requirements contained in the RH TRU WCPIP, as well as those requirements of the WIPP RESOURCE Conservation and Recovery Act (RCRA) permit described in the WAP. Observers from the NMED were in attendance, as well as Environmental Protection Agency (EPA) inspectors reviewing WCPIP compliance. The audit team therefore reviewed documentation to support both sets of requirements, completing WCPIP checklists and WAP B6-3 and B6-1 checklists, and compiling and reviewing objective evidence to demonstrate compliance. The objective evidence included the AK Summary Report CCP-AK-ORNL-500 R.0, numerous AK source documents, a WCPIP-compliant WSPF, the Characterization Reconciliation Report and supporting documentation, and DTC and VE BDRs for three containers from the waste stream population. Examples from the AK record were reviewed to assure that all of the DQOs cited in the WCPIP were met, including the defense determination. In addition, the auditor team examined the AK record regarding the methods for qualification of AK information, as required by the WCPIP.

With regard to the WAP requirements, in addition to the AK Summary and AK Source Document Summaries cited above, the audit team reviewed the AK Documentation Checklist, attachment 1; the AK Source Document Reference List, attachment 4; the AK Hazardous Constituents List, attachment 5; the AK Waste Form, Waste Material Parameters, Prohibited Items and Pkg. attachment 6; and the AK Container List, attachment 8. Examples of the resolution of AK discrepancies were also collected and examined along, with screenshots from the Project Tracking System (PTS) and AK Tracking Spreadsheet databases. The required HGAS sampling and analysis has not yet been completed, but the audit team reviewed the Random Container Selection reports for sampling lots 1 and 2.

The audit team reported a concern regarding the support in referenced AK Source Documents for the assignment of hazardous constituents and hazardous waste numbers as noted in Table 5-3 of AK Summary CCP-AK-ORNL-500. Specifically, AK Source Document C078 is the only support in the AK record for the presence of 1,1,2-trichloroethane, methyl ethyl ketone, benzene, and selenium in this waste stream. It is not clear from a review of this document that these assignments are justified. The concern was resolved during the audit with the removal of the hazardous waste number for selenium (D10), and the modification of several entries in Table 5-3, including the
removal of methyl ethyl ketone, with no other impact on hazardous waste number assignment. See CDA-1 in section 6.2.

Overall, the AK Program was found to be adequate in addressing the requirements of the WCPIP and the WAP as applicable, satisfactory in the implementation of these requirements, and effective in achieving the desired results.

5.2.4 Table B6-4, Headspace Gas

Headspace Gas sampling was not in the scope of this audit. Headspace gas sampling activities for S5000 debris waste were evaluated during ORNL/CCP Audit A-08-04.

5.2.5 Table B6-5, Radiography Checklist

Radiography is not in the scope of this audit. ORNL/CCP is not characterizing any S5000 RH debris waste utilizing RTR at this time.

5.2.6 Table B6-6, Visual Examination

The audit team reviewed implementation of VE operations and collected objective evidence to support the effectiveness of implementation. VE activities were evaluated and verified by conducting personnel interviews, examination of VE personnel training records, and evaluating BDRs and associated documentation.

The audit included the review of Procedure CCP-TP-163, CCP Standard Visual Examination of Records, and CCP-TP-500, RH Waste Visual Examination. The audit team observed VE operations for RH waste drum ORRH-00015 on July 1, 2008, in the 7880 hot cell. VE operations involve the transfer of RH waste from casks into drums.

CCP Standing Order CCP-SO-ORNL-003 accommodates ORNL/CCP loading of RH waste directly into drums. VE operations at ORNL/CCP utilize a second operator to provide verification by reviewing contents of the waste containers. Three BDRs were examined, as well as training records for three VE operators. VE operations were found to be adequate, satisfactorily implemented, and effective. No concerns were identified.

5.2.7 Radiological Characterization - Dose-to-Curie (DTC) Methodology

The audit team assessed the adequacy, implementation, and effectiveness of the DTC methodology used at ORNL/CCP to characterize waste stream OR-RED-C-RH-RHET, consisting of approximately 270 1.6 cubic meter casks of RH TRU debris waste. Inventory information to support development of DTC partitioning and scaling factors was presented for waste generated in the Mark-42 time period (between November 1991 and February 2007). The audit team evaluated both the development of scaling factors that relate the measured dose rate to the average activity, and the actual measurement of the dose rate. 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 ORNL to characterize RH TRU was not previously evaluated by CBFO.

Based on a review of the current revisions of CCP procedures and reports provided prior to and during the audit, checklists were prepared and used to evaluate the following:

- Development of average radionuclide ratios through examination of process records and historic swipe sample data, and confirmation of both by examination of previously collected CH waste data from the Mark-42 time period;
- 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;
- Results of applying the DTC methodology to characterize waste as evidenced in BDRs ORRHDT08002, ORRHDT08003, and ORRHDT08004 representing the Mark-42 time period;
- Determination of the number of containers examined, completed BDRs and BDRs that had been through project-level review that were generated prior to this audit;
- Completed BDRs to ensure data are reported and reviewed as required;
- Data storage and retrievability;
- Personnel qualification and training

The source of the RH waste at the ORNL that was presented as part of this audit was the separation of transcurium elements from curium targets and the assembly, dissolution, and chemical processing of curium and transcurium elements in the Radiochemical Engineering Development Center (REDC) characterized by the introduction of Mark-42 and High Flux Isotope Reactor (HFIR) targets between November 1991 and February 2007.

Based on process records documenting the input source term, and some isotopic ratios and sample data collected for 60 smear samples and 2 leach samples, partitioning factors were developed to account for how Cs-137 was distributed within the waste material. Scaling factors then were developed using various sources of AK to account for the ratios of the isotopes of interest to Cs-137. The scaling factors then were confirmed by examining data from CH waste analysis that had occurred prior to the development of the DTC method. The CH waste had been segregated from the RH waste from the same time period referred to as the Mark-42 time period (November 1991 through February 2007).
Measurements of the external dose or exposure rates of the waste are made in a hot cell in building 7880, hot-cell room 231. The exposure rate, attributed entirely to Cs-137, is measured four times at a distance of 1.0 meter from the 55-gallon waste containers. The audit team examined the apparatus for performing DTC. A (XC-0673) survey meter is used to measure the dose rate. Each container is rotated 90 degrees successively between each of the four measurements. The average measured dose or exposure rate for each 55-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, observed equipment and practices, and examined electronic and paper copies of reports and records. The audit team identified one concern regarding the lack of a traceability statement for the calibration standard used on one of the DTC probes. The necessary document was provided and the concern was closed during the audit. See CDA-2 in section 6.2.

Prior to this audit, three BDRs had been completed through project-level review (ORRHDTCT08002, ORRHDTCT08003, and ORRHDTCT08004) consisting of three drums each for a total of nine.

Overall, DTC procedures and activities were determined to be adequate, satisfactorily implemented, and effective.

6.0 CORRECTIVE ACTIONS, OBSERVATIONS, AND RECOMMENDATIONS

6.1 Corrective Action Reports

During the audit, the audit team may identify conditions adverse to quality (CAQs) 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 Quality Assurance (QA) program.*

No CARs were issued during Audit A-08-12.

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 definition below.

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.

Two CDAs, described below, were identified and corrected during the audit.

**CDA-1**

CDA-1 was identified during the evaluation of Acceptable Knowledge. AK Source Document C078 was the only reference in the AK record for the presence of 1,1,2-trichloroethane, methyl ethyl ketone, benzene, and selenium in this waste stream. It was not clear from a review of this document that these assignments were justified.

ORNL/CCP AKEs reviewed AK Source Document (C078) and other AK Source Documents utilized to justify the assignment of all hazardous waste numbers for the subject waste stream. As a result, the D010 (selenium) was removed from this stream. Furthermore, other hazardous constituents including methyl ethyl ketone and mercuric chloride, were removed from Table 5-3 of CCP-AK-ORNL-500. Other appropriate changes were made to this table for constituents not resulting in a hazardous waste number assignment to coincide with the supporting AK documentation. A discrepancy report (DR602) was prepared to document all of these changes. A draft revision of the AK Summary Document, CCP-AK-ORNL-500, rev. 1, draft A, was prepared as well.

The concern was resolved during the audit with the removal of the hazardous waste number for selenium, D10, and the modification of several entries in Table 5-3, including the removal of methyl ethyl ketone, with no other impact on hazardous waste number assignment.

The audit team was able to verify corrective actions were completed prior to the end of the audit.

**CDA-2**

CDA-2 was identified during the evaluation of Radiological Characterization. While verifying the required contents for certificates of calibration, CCP provided a copy of the calibration certificate for ORNL/CCP Instrument ID #XC0672 (DTC Probe), which
lacked the required statement regarding traceability to national standards. After discussions, it was determined that page 2 of the certificate was missing.

ORNL/CCP provided a copy of page 2 of the certificate of calibration for instrument ID #XC0672 containing the required traceability statement.

The audit team was able to verify corrective actions 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 ORNL/CCP management as a result of the audit.

7.2 Recommendations

No Recommendations were presented to ORNL/CCP management as a result of this audit.

8.0 LIST OF ATTACHMENTS

Attachment 1: Personnel Contacted During the Audit
Attachment 2: Summary Table of Audit Results
Attachment 3: Table of Audited Documents
Attachment 4: List of Processes and Equipment Reviewed
## Personnel Contacted During the Audit

**Personnel Contacted During Audit A-08-12**

<table>
<thead>
<tr>
<th>Name</th>
<th>Org/Title</th>
<th>PreAudIT Meeting</th>
<th>Contacted During Audit</th>
<th>Post-Audit Meeting</th>
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<tr>
<td>Bob Billett</td>
<td>CCP/WTS Operations Manager</td>
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<tr>
<td>Quincy Carter</td>
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<tr>
<td>Don Coffey</td>
<td>TWPC WP Tech Support</td>
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<tr>
<td>Kevin D. East</td>
<td>TWPC RHL</td>
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<tr>
<td>Mark Doherty</td>
<td>CCP/Tech Specs AKE</td>
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<tr>
<td>Jerry Erpenbach</td>
<td>TWPC QA Manager</td>
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<td></td>
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<tr>
<td>Rick Fan</td>
<td>DOE/ORO Facility Rep</td>
<td>X</td>
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<tr>
<td>Edward Felton</td>
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<td>Mike Fryberger</td>
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<td>Dorothy Gill</td>
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<td>Mary Griffith</td>
<td>CCP/MCS RH DTC Lead Operator</td>
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<td>LaTravia Harmon</td>
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<td>James Holderness</td>
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**Definitions**

- **E** = Effective
- **S** = Satisfactory
- **I** = Indeterminate
- **M** = Marginal
- **U** = Unsatisfactory

- **CAR** = Corrective Action Report
- **CDA** = Corrected During Audit
- **EP** = Exemplary Practice
- **Obs** = Observation
- **Rec** = Recommendation
- **A** = Adequate
- **NE** = Not Effective
- **NA** = Not Adequate
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<td>CCP-TP-003</td>
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<td>CCP-TP-005</td>
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<td>CCP Dose-to-Curie Survey Procedure for Remote-Handled Transuranic Waste</td>
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## List of Processes and Equipment Reviewed

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<th>WIPP #</th>
<th>Process/Equipment Description</th>
<th>Applicable to the Following Waste Streams/Groups of Waste Streams</th>
<th>Currently Approved by NMED</th>
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<td>N/A</td>
<td>Acceptable Knowledge Procedure – CCP-TP-002 &amp; CCP-TP-005</td>
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### PREVIOUSLY APPROVED PROCESSES OR EQUIPMENT
ORNL/CCP Audit A-08-04 Contact-handled (CH) S5000 debris waste

### NEW PROCESSES OR EQUIPMENT
ORNL/CCP Audit A-08-12 Remote-handled (RH) S5000 debris waste

<p>| N/A | Acceptable Knowledge Procedure – CCP-TP-002, CCP-TP-005, &amp; CCP-TP-506 | Debris (S5000) | NO | NO |</p>
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<th>Process/Equipment Description</th>
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<td>Data Generation and Project Level Validation &amp; Verification (V&amp;V) Procedure – CCP-TP-001</td>
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