UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OCT 4 2017

Mr. Todd Shrader
Manager, Carlsbad Field Office
U.S. Department of Energy
P.O. Box 3090
Carlsbad, New Mexico 88221-3090

Dear Mr. Shrader:

On February 7-9, 2017, the U.S. Environmental Protection Agency conducted a baseline inspection of the Waste Isolation Pilot Plant (WIPP) waste characterization activities implemented by the Los Alamos National Laboratory - Central Characterization Program (LANL-CCP). The decision to conduct a baseline inspection at LANL-CCP was based on the determination that changes specific to Acceptable Knowledge (AK) significantly altered the process that the EPA had previously evaluated and approved at LANL-CCP and other transuranic waste generator sites. These changes were made in response to the U.S. Department of Energy's Accident Investigation Board's findings related to the radiological release of February 14, 2014.

The Agency conducted the LANL-CCP baseline inspection to evaluate the newly-implemented transuranic waste characterization process changes, particularly enhanced AK, implemented to meet the WIPP Waste Acceptance Criteria, Revision 8.0. In addition to enhanced AK, the EPA assessed the technical adequacy of Visual Examination and Non-Destructive Assay implementation. The results of the baseline inspection are discussed in the enclosed report (EPA Air eDocket No: EPA-HQ-OAR-2017-0231-0003).

In accordance with 40 CFR 194.8, EPA issued a *Federal Register* notice (Volume 82, No. 134, pages 32542-46, July 16, 2017) announcing the EPA's proposed approval of the LANL-CCP's contact-handled transuranic waste characterization program and requesting public comment. The EPA received no public comment on the proposed approval notice and associated inspection report.

The EPA approves the contact-handled transuranic waste characterization activities implemented by LANL-CCP at Technical Area 55 in accordance with the conditions and restrictions discussed in the enclosed report and summarized in Table 1 of that report. The Central Characterization Program may continue to implement the enhanced AK process discussed in the accompanying LANL-CCP baseline inspection report to characterize both contact- and remote-handled transuranic waste types at LANL-CCP and other transuranic waste generator sites. The EPA also approves Non-Destructive Assay using the High Efficiency Neutron Counter No. 3 and Visual Examination for contact-handled transuranic waste.

If you have questions, please have your staff contact Rajani Joglekar (202-343-9462) or Ed Feltcorn (202-343-9422).

Sincerely,

Lee Ann B. Veal

Lee Ann B. Veal
Director
Radiation Protection Division

Enclosure

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DOCKET NO: A-98-49; II-A4-212
EPA AIR E-DOCKET NO: EPA-HQ-OAR-2017-0231-0003

WASTE CHARACTERIZATION INSPECTION REPORT

EPA BASELINE INSPECTION NO. EPA-LANL-CCP-CH-02.17-8 OF THE CENTRAL CHARACTERIZATION PROGRAM CONTACT-HANDLED TRANSURANIC WASTE CHARACTERIZATION PROGRAM FOR THE LOS ALAMOS NATIONAL LABORATORY: February 7–9, 2017

U.S. Environmental Protection Agency
Radiation Protection Division
Center for Waste Management and Regulations
1200 Pennsylvania Avenue, NW
Washington, DC 20460

September 2017

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ATTACHMENTS

ACRONYMS AND INITIALIZATIONS

AaS	Add-A-Source
AK	acceptable knowledge
AKA	acceptable knowledge assessment
AKE	acceptable knowledge expert
AKTSS	acceptable knowledge tracking spreadsheet
AKSR	acceptable knowledge summary report
Am	americium
BDR	batch data report
BOK	basis of knowledge
CBFO	Carlsbad Area Field Office
CCEM	chemical compatibility evaluation memorandum
CCO	criticality control overpacks
CCP	Central Characterization Program
Cf	californium
CFR	Code of Federal Regulations
CH	contact-handled
Ci	curie
CIS	Characterization Information Summary
CMR	Chemical and Metallurgical Research
CRR	Characterization Reconciliation Report
Cs	cesium
DOE	U.S. Department of Energy
DR	discrepancy resolution
EA	Expert Analyst
EPA	U.S. Environmental Protection Agency
EU	Enriched Uranium
FR	*Federal Register*
FRAM	Fixed-Energy Response Function Analysis with Multiple Efficiencies
g	gram or grams
g/cm^3	grams per cubic centimeter
HENC	High-Efficiency Neutron Counter

HLW	high-level waste
HS	heat source
in	inch or inches
INL	Idaho National Laboratory
ISOCS	In-Situ Object Counting System
ITR	Independent Technical Reviewer
IWMDL	Interface Waste Management Documents List
keV	kiloelectron volt
kg	kilogram or kilograms
LANL	Los Alamos National Laboratory
LLD	lower limit of detection
LOQI	list of qualified individuals
LWA	WIPP Land Withdrawal Act
MDA	minimum detectable concentration
MGA	Multi Group Analysis
mrem/hr	millirem per hour
MT	Material Type
nCi/g	nanocuries per gram
NCR	non-conformance report
NDE	non-destructive examination
Np	neptunium
NTP	National TRU Program
ORIA	Office of Radiation and Indoor Air
OSRP	Offsite Source Recovery Program
PDP	Performance Demonstration Program
POC	pipe overpack container
Pu	plutonium
Pu_{Eff}	effective plutonium
RTR	real-time radiography
RWMC	Radioactive Waste Management Complex
SCG	summary category group
SD	source document
SNF	spent nuclear fuel

SPM	Site Project Manager
Sr	strontium
T1	Tier 1
T2	Tier 2
TA	technical area
TAAC	TRU alpha activity concentration
TID	tamper indicating device
TMU	Total Measurement Uncertainty
TRU	transuranic
U	uranium
VE	visual examination
VEE	visual examination expert
VEO	visual examination official
WAC	waste acceptance criteria
WDS	WIPP Waste Data System
WG	weapons grade
WIPP	Waste Isolation Pilot Plant
WMP	waste material parameter
WSPF	Waste Stream Profile Form

1.0 EXECUTIVE SUMMARY

This report supports the U.S. Environmental Protection Agency's final baseline approval of the contact-handled (CH) transuranic (TRU) debris waste characterization program implemented by the Central Characterization Program (CCP) at the U.S. Department of Energy's (DOE's) Los Alamos National Laboratory (LANL), in Los Alamos, New Mexico, consistent with the limitations described in this report. On February 7-9, 2017, the EPA performed a baseline inspection to evaluate CCP-implemented changes to the acceptable knowledge (AK) process, referred to as enhanced AK, addressing the waste characterization process deficiencies noted by the DOE Accident Investigation Board.

On July 14, 2017, the EPA issued a Federal Register notice of availability of the proposed LANL baseline inspection report with a 45-day public comment period (Volume 82, No. 134, pages 32542-46). The EPA determined that a baseline inspection was necessary since the newly-implemented enhanced AK process was significantly different from the processes EPA approved in June 2007 (EPA Docket No. A-98-49; II-A4-88). The 45-day comment period closed on August 28th. The EPA did not receive any comments. The EPA response to public comment is discussed in Section 7.0 of this report.

DOE may resume emplacement of LANL-CCP CH TRU debris and solid waste from Technical Area-55 in the Waste Isolation Pilot Plant (WIPP). This resumption may begin after CBFO issues a memorandum, with EPA concurrence, certifying the subject CH TRU waste characterization program. Additionally, CCP may implement the enhanced AK process discussed in this report at other TRU waste generator sites they manage. The EPA will verify the technical adequacy of the implemented enhanced AK process during respective site-specific continued compliance inspections. However, DOE may not dispose of CH waste from Technical Area-54 (TA-54) until the EPA approves a Tier 1 change to add characterization processes at TA-54 that the EPA inspected on May 23-25, 2017.

The scope of the February 2017 baseline inspection included:

- The Acceptable Knowledge process, focusing on the enhanced AK process for CH TRU debris and solid/sludge waste (SCG S5000 and S3000, respectively), including debris waste from the Offsite Source Recovery Program (OSRP).
- The nondestructive assay (NDA) process, specifically, the High-Efficiency Neutron Counter (HENC) No. 3 (HENC3).
- The visual examination (VE) process for CH TRU waste, as performed at Technical Area No. 55 (TA-55), the Chemistry and Metallurgy Research (CMR) facility and under the LANL OSRP.
- WIPP Waste Data System (WDS) controls ensuring that only fully characterized and certified TRU waste containers can be emplaced at WIPP.

Attachment F is a list of all documentation reviewed, including all documentation revised during the inspection process and batch data reports (BDRs).

The baseline inspection evaluated LANL-CCP's CH waste characterization program for technical adequacy. With this approval, LANL-CCP may continue to implement the following TRU waste characterization program components to characterize CH TRU debris and solid waste. Specifically, the approval includes:

(1) The Acceptable Knowledge process for LANL CH TRU debris and solid waste, including the enhanced Acceptable Knowledge process.

(2) The HENC3 NDA (nondestructive assay) system for characterizing CH TRU waste at TA-55.

(3) The Visual Examination process to identify waste material parameters (WMPs) and the physical form of CH TRU debris and solid waste at TA-55 and the CMR Facility.

Although not a formal part of the LANL baseline approval, the EPA did evaluate the efficacy of the WDS controls to adequately ensure that only fully characterized and certified TRU waste containers can be emplaced at WIPP.

Any changes to the waste characterization activities after the date of the baseline inspection must be reported to and, if applicable, approved by the EPA according to Table 1. All T1 changes must be submitted for approval before their implementation and will be evaluated by the EPA. Upon approval, the EPA will post the results of the evaluations through the EPA website and the WIPPNEWS list. LANL-CCP must submit Tier 2 (T2) changes that have been implemented four times a year at the end of each fiscal quarter.

The EPA LANL baseline approval letter and this report is made available through the EPA website and by emails to the WIPPNEWS list, in accordance with 40 CFR 194.8(b)(3).

Table 1. Tiering of Contact-Handled Transuranic Waste Characterization Processes Implemented by LANL-CCP (Based on February 7–9, 2017 Baseline Inspection)

Process Elements	LANL-CCP Waste Characterization Process – T1 Changes	LANL-CCP Waste Characterization Process – T2 Changes*
Acceptable Knowledge, including Load Management	Characterization of SCG S4000 waste. Any implementation of payload management	Submission of a list of active LANL-CCP CH AKEs and SPMs that performed work during the previous quarter Notification to the EPA upon completion of or substantive modification** to: • CCP-TP-005 forms (Attachments 6, 7, 8 and 9) and associated memoranda (i.e., WMP, AK-NDA, add-container memoranda) • AK accuracy reports (annually, at a minimum) • AK reassessment memoranda and Discrepancy Resolution Reports • WSPFs and any associated change notices • AKSRs • Site procedures requiring CBFO approval • Enhanced AK documents such as AKAs (including addition of new figures), CCEMs and BOK memoranda
Nondestructive Assay	New equipment or substantive physical modifications** to approved equipment Extension of or changes to approved calibration ranges for approved equipment	Submission of a list of LANL-CCP NDA operators, EAs and ITRs that performed work during the previous quarter Notification to the EPA upon substantive modification** to: • Software for approved equipment • Operating ranges upon CBFO approval • Site procedures requiring CBFO approval
Real-Time Radiography	Any implementation of the real-time radiography process.	None
Visual Examination	Implementation of any visual examination process for SCG S4000 waste.	Submission of a list of LANL-CCP VE operators, VE Experts and ITRs that performed work during the previous quarter Notification to the EPA upon substantive modification** to site procedures requiring CBFO approval, including OSRP visual examination technique procedure

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

** "Substantive modification" refers to a change with the potential to affect LANL-CCP's CH waste characterization processes or documentation of them, excluding changes that are solely related to the environment, safety and health; nuclear safety; or the Resource Conservation and Recovery Act; or that are editorial in nature or are required to address administrative concerns. The EPA may request copies of new references that DOE adds during a document revision.

2.0 PURPOSE OF BASELINE INSPECTIONS

On May 18, 1998, the EPA certified that the WIPP would comply with the radioactive waste disposal regulations in 40 CFR Part 191. In that certification, the EPA also included Condition 3, which states that "the Secretary shall not allow shipment of any waste from…any waste generator site other than [Los Alamos National Laboratory (LANL)] for disposal at the WIPP until the Agency has approved the processes for characterizing those waste streams for shipment using the process set forth in §194.8." The approval process described in 40 CFR 194.8 requires the DOE to (1) provide the EPA with information on AK for waste streams proposed for disposal at the WIPP, and (2) implement a system of controls used to confirm that the total amount of each waste component that will be emplaced in the WIPP will not exceed limits identified in the most recent WIPP Compliance Certification Application.

The rule applying to this baseline inspection can be found in the Federal Register (FR) (Vol. 69, No. 136, pp. 42571–42583, July 16, 2004). Under the changes to 40 CFR 194.8 promulgated in the July 16, 2004, FR notice, the EPA must perform a baseline inspection of a TRU waste generator site's waste characterization program. The purpose of the baseline inspection is to review the site's waste characterization program. This review is based on the demonstration that the program's components, with applicable conditions and limitations, can adequately characterize TRU wastes and comply with the regulatory requirements imposed on TRU wastes destined for disposal at the WIPP. An EPA inspection team conducts an on-site inspection to verify that the site's system of controls is technically adequate and properly implemented. Specifically, the EPA's inspection team verifies compliance with 40 CFR 194.24(c)(4), which states the following:

> *Any compliance application shall: . . . Provide information which demonstrates that a system of controls has been and will continue to be implemented to confirm that the total amount of each waste component that will be emplaced in the disposal system will not exceed the upper limiting value or fall below the lower limiting value described in the introductory text of paragraph of this section.*[1] *The system of controls shall include, but shall not be limited to: measurement; sampling; chain of custody records; record keeping systems; waste loading schemes used; and other documentation.*

In other words, the purpose of the baseline inspection is to evaluate the implementation of 40 CFR part 194 requirements by assessing whether the DOE sites that characterize TRU waste prior to disposal at the WIPP are capable adequately doing so. The EPA may also conduct follow-up inspections to address issues remaining from the baseline inspection or to seek further clarification/discussion related to waste characterization processes evaluated during a baseline inspection. By approving the CCP-implemented waste characterization systems and processes at LANL-CCP for CH TRU waste, the EPA confirms that it has evaluated the capabilities of systems and processes implemented by the site to accomplish two tasks: (1) identification and measurement of waste components, such as plutonium (Pu), that must be tracked for

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

compliance,[2] and (2) confirmation that the waste in any given container has been properly identified as belonging to the group of approved waste streams.

3.0 PURPOSE OF THIS REPORT

This report documents the basis for the EPA's approval of the LANL-CCP waste characterization program for CH TRU wastes. Specifically, this report:

- Describes the LANL-CCP waste characterization systems approved.
- Delineates a specific set of CH wastes approved.
- Provides objective evidence supporting the approval basis for all waste characterization systems.
- Identifies all relevant system limitations and/or conditions for each waste characterization system and/or waste containers that are subject to this approval.

4.0 SCOPE OF INSPECTION

The scope of Baseline Inspection No. EPA-LANL-CCP-CH-02.17-8 included the technical adequacy of the waste characterization systems used by LANL-CCP to characterize solid (SCG S3000) and debris (SCG S5000) CH TRU waste at TA-55 and the CMR. EPA conducted Baseline Inspection No. EPA-LANL-CCP-CH-02.17-8 at LANL on February 7–9, 2017, at LANL in Los Alamos, New Mexico. Prior to the LANL site visit, the EPA met with representatives of the CCP to discuss components of the enhanced AK in Vienna, Virginia, on January 10–11, 2017.

The purpose of this inspection was to determine the site's compliance with 40 CFR 194.24. The EPA inspection team evaluated the LANL-CCP waste characterization systems with respect to AK, NDA, which in this case was the HENC3 system, and nondestructive examination (NDE), which in this case was VE.

The EPA performed this inspection by executing the following:

(1) Obtaining and reviewing site procedures, reports, and other technical information used to characterize CH TRU debris and solid waste, including waste from the OSRP.

(2) Observing NDA and VE at LANL.

(3) Observing a demonstration of WDS.

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

(4) Preparing technical questions prior to the inspection based on the activities cited in (1) above.

(5) Interacting with CBFO and LANL-CCP personnel to arrange inspection logistics.

(6) Evaluating LANL-CCP's implementation of waste characterization processes for adequacy and demonstrating compliance with 40 CFR 194.24 requirements.

(7) Conducting the baseline inspection to verify the technical adequacy and/or qualifications of CH waste characterization personnel, procedures, processes, and equipment, as documented in LANL-CCP records.

(8) Evaluating the correlations of containers for the purpose of identifying common attributes.

(9) Communicating all pertinent information to CBFO and LANL-CCP personnel.

(10) Conducting entrance, exit, and daily briefings for CBFO and LANL-CCP management personnel for all segments of the inspection.

(11) Obtaining and reviewing LANL-CCP documents that were revised and/or created in response to inspection.

(12) Issuing the inspection report and approval.

During an inspection, the EPA does not approve characterization data; that function is the sole responsibility of the entity being evaluated, in this case, LANL-CCP. The EPA evaluates the site's waste characterization processes to characterize CH TRU waste. The LANL-CCP evaluation consisted of reviewing training records and interviewing waste characterization personnel to assess their understanding of: (a) the EPA's waste characterization and WIPP waste disposal requirements; (b) waste characterization processes implemented and available as alternatives; and, (c) LANL-CCP's documentation and record-keeping procedures.

In addition, the EPA evaluation focused on observing equipment operations and waste characterization practices at LANL controlled by site procedures, and inspecting records related to each of the waste characterization processes within the inspection's scope. An important aspect of this evaluation is the objective evidence documenting the effectiveness of the waste characterization processes. Objective evidence typically takes the form of AK, NDA and VE records, including BDRs. During this inspection, the EPA selected samples of each of these items, based on the number and variety of items each waste characterization process produced, consistent with standard auditing techniques. Based on an evaluation of the waste characterization processes in conjunction with the objective evidence, the EPA determined the technical adequacy of these processes and associated records within the inspection's scope.

The DOE documents that the EPA reviewed for this evaluation are cited throughout the report and are listed in Attachment F. Any of these documents can be requested from the following address:

Director, NTP Compliance Division
Carlsbad Field Office
U.S. Department of Energy
P.O. Box 3090
Carlsbad, New Mexico 88221-3090

5.0 INSPECTION PERSONNEL

The EPA and its support personnel conducted interviews with LANL-CCP personnel in several disciplines during the site visit to LANL and the meeting in Vienna, Virginia. The members of the EPA inspection team and personnel contacted are listed in Attachment A.

6.0 TECHNICAL EVALUATION

Sections 6.2 through 6.4 of this report detail the three technical areas assessed during this inspection: AK, NDA and VE. The EPA's evaluation of WDS is described in section 6.5. Completed inspection checklists are included in Attachments B, C and E.

6.1 Los Alamos National Laboratory Background

LANL is located in Los Alamos, New Mexico, approximately 25 miles northwest of Santa Fe, New Mexico, and encompasses an area of 43 square miles. The primary mission of LANL since its creation in the 1940s has been nuclear weapons research and development. Its current mission supports civilian defense and includes large waste management and stockpile stewardship components. In 1998, LANL was the first DOE site authorized by the EPA to ship waste to the WIPP. In 2003, CCP assumed responsibilities for CH TRU waste certification activities at the site.

Previous EPA Inspections/Approvals

As stated previously, the EPA approved LANL-CCP's CH TRU waste characterization program in June 2007 (EPA Docket No. A-98-49; II-A4-88). In February of 2014, a LANL-treated, repackaged nitrate waste container underwent an energetic exothermic reaction resulting in a "deflagration" and radiation release after emplacement at WIPP. The subsequent DOE corrective actions to address chemical compatibility resulted in revisions to the AK generation process. The newly-implemented AK changes and resulting AK documentation are significantly different from what the EPA has previously evaluated and approved at various TRU waste characterization sites, including LANL-CCP, under 40 CFR 194.8. The EPA informed the CBFO in a letter dated May 19, 2016, that the EPA would conduct a baseline inspection to address the waste characterization changes and allow an opportunity for the public to comment on EPA's evaluation of the changes. The EPA's decision to conduct a baseline inspection of LANL-CCP does not imply a change to the regulatory framework in 40 CFR Part 194.

6.2 Acceptable Knowledge

Waste Characterization Element Description

The EPA evaluated LANL-CCP's AK waste characterization program for CH TRU waste characterization, focusing on the new enhanced AK process. The EPA conducted this inspection by reviewing documents and records associated with a representative sample of SCG S3000 (homogeneous solids) and SCG S5000 (heterogeneous debris) waste streams, including an OSRP waste stream. Inspection details and specific documents and records evaluated for each Item summarized below are recorded in the AK checklist that is included in Attachment B. The nine waste streams sampled during this inspection are listed below in Table 2.

Table 2. LANL-CCP Waste Streams Sampled for Evaluation

Waste Stream	AKSR*
LA-MHD09.001	004
LA-MIN03-NC.001	004
LA-MHD01.001	006
LA-CIN01.001	006
LA-MIN02-V.001	006

Waste Stream	AKSR*
LA-MIN04-S.001	006
LA-OS-00-01.001	008
LA-MHD03.001	009
LA-MHD04.001	010

*The full AKSR citation for each waste stream is CCP-AK-LANL-XXX, where XXX represents the numbers indicated in the AKSR column. For example, the full citation for AKSR-004 is CCP-AK-LANL-004.

EPA did not evaluate any AK documentation related to SCG S4000 (soil) waste streams. Characterization of any SCG S4000 waste by LANL-CCP is a T1 change (see Table 1).

Technical Evaluation

(1) The EPA examined personnel training and qualifications and found them to be adequate.

LANL-CCP provided qualification cards for all Acceptable Knowledge Experts (AKEs) and Site Project Managers (SPMs) that actively work with the LANL-CCP waste characterization program. The EPA reviewed the qualification cards provided as well as documentation showing familiarity of the AKEs and SPMs with current revisions of relevant procedures and program documents. The EPA also interviewed a portion of the listed AKEs and SPMs. The EPA has no issues with LANL-CCP personnel qualifications for AKEs and SPMs.

Submission to the EPA of a list of AKEs and SPMs who performed work in these roles for the LANL-CCP waste characterization program in the previous quarter is a T2 change (see Table 1).

(2) The EPA assessed nonconformance and discrepancy resolution documentation and found it to be adequate.

The EPA evaluated sample discrepancy resolution (DR) and nonconformance reporting and found that the discrepancies were adequately documented and resolved. None of the discrepancies resolved in the last several years resulted in the need to do an AK reevaluation or revise the AKSR.

Notification to the EPA upon completion of or substantive modification to AK reassessment memoranda and DR reports is a T2 change (see Table 1).

(3) The EPA assessed documentation of waste stream definitions and waste traceability and found that the definitions are adequately supported and waste containers are adequately traceable.

The EPA evaluated waste stream definitions documented in four AK summary reports (AKSRs) and supported by various source documents, CCP-TP-005 forms (i.e., Attachment 6, Attachment 7). During this evaluation, EPA verified:

- All waste within a waste stream was generated from a single process or activity.
- All waste within a waste stream is similar in material and physical form and that the expected physical parameters are adequately described.
- The expected radiological parameters are adequately documented.
- Any use of AK (and associated limitations) in NDA are clearly documented and communicated between AK and NDA personnel.
- Waste containers assigned to specific waste streams are traceable from generation through characterization and have documentation supporting inclusion in the waste stream.

Notification to the EPA upon completion of or substantive modification to all AKSRs and CCP-TP-005 forms (Attachments 6, 7 and 8) and memoranda associated with all three forms are T2 changes (see Table 1).

(4) The EPA evaluated implementation of the enhanced acceptable knowledge process and found it to be adequate.

The enhanced AK process is intended to document 1) evaluation of container-specific AK to provide reasonable assurance that the waste container management and packaging activities are bounded by the applicable AK, and 2) evaluation of waste stream-specific AK to provide reasonable assurance that all potential chemical incompatibilities have been identified and evaluated for impact to long-term isolation of TRU waste.

LANL-CCP currently has two ways of documenting the container-specific evaluation: 1) CCP-TP-005, Attachment 9 forms, Interface Waste Management Documents List (IWMDL), for containers added to a waste stream since August 2015 (following the implementation of CCP-TP-005, Revision 27 dated August 26, 2015) or 2) an AK Assessment (AKA) for containers added to a waste stream prior to August 2015. The EPA reviewed a sample of Attachment 9 forms and their applicability to containers added to the AK Tracking Spreadsheet since August 2015. The Attachment 9 forms identify LANL and/or LANL-CCP procedures applicable to the packaging, management and control of waste containers as well as subject matter experts responsible for each procedure. As the procedures are revised, or at least quarterly, the Attachment 9 forms and the procedures are evaluated for any changes that could impact the AK and characterization. The review of new versions of the procedures is

documented on the CCP-TP-005, Attachment 3 form, Acceptable Knowledge Source Document Summary. In a few cases, LANL generated waste containers prior to issuance of the first Attachment 9 form, but the containers were not added to the waste stream until after the Attachment 9 form was in place. LANL-CCP evaluated the earlier revisions of applicable procedures and determined that the Attachment 9 form listing more recent versions of the procedures was still applicable and bounding. This determination is documented in the Add Container Memoranda (Revision C225). This approach to conducting the container-specific evaluation for containers generated prior to August 2015 but not added to the waste stream until after August 2015 is reasonable.

AKAs will only be generated for containers not yet emplaced at WIPP. LANL-CCP has generated six AKAs associated with four waste streams, which EPA found adequate. Some of the AKAs were specific to waste that was stored at the Waste Handling Building at WIPP; these are not expected to be modified to add additional containers. For the containers currently stored at Waste Control Specialists in Texas or on site at LANL, LANL-CCP must generate an AKA with a detailed description of every revision of every applicable waste management procedure in place from the beginning of waste stream generation through the versions included on the first applicable Attachment 9 form. As groups of containers are determined to be bounded by the procedure descriptions in an existing AKA, the LANL-CCP AKE will append the container lists and explanations (listed in the AKA as figures) to the back of the AKA. This method of attaching figures to the AKAs may also be used to remove containers from the AKA if the AK or acceptability requirements change. This approach is reasonable.

The waste stream-specific evaluation for chemical compatibilities is currently being documented on a chemical compatibility evaluation memorandum (CCEM). In general, LANL-CCP intends to generate one CCEM for each waste stream that has containers yet to be emplaced at WIPP. However, as with the AKAs, LANL-CCP has generated a few Waste Handling Building-specific CCEMs to facilitate emplacement of those containers. EPA reviewed five CBFO-approved LANL-CCP CCEMs associated with four waste streams as part of this inspection and found the assumptions that form the bases of the CCEM conclusions are clearly documented to support DOE's chemical compatibility determination.

The sample Attachment 9 forms, AKAs and CCEMs that the EPA reviewed adequately demonstrate implementation of the enhanced AK process. Notification to EPA upon completion of or substantive modification to CCP-TP-005, Attachment 9 forms; AKAs (including addition of new figures); CCEMs and/or other documentation of waste handling and chemical compatibility evaluations and Basis of Knowledge (BOK) memoranda are T2 changes (see Table 1). Note that this T2 requirement applies to all substantive modifications of these documents, not just those modifications that are considered revisions.

(5) The EPA evaluated the waste stream certification process and found it to be adequate.

The EPA evaluated samples of the documents commonly associated with SPM certification of the waste streams, including characterization checklists, characterization information summaries (CISs), waste stream profile forms (WSPFs) and AK accuracy reports. The EPA found that LANL-CCP's certification process is adequate and appropriately documented.

Notification to the EPA upon completion of or substantive modification to all WSPFs and any associated Change Notices, is a T2 change (see Table 1).

Notification to the EPA upon completion of or substantive modification to AK accuracy reports (annually, at a minimum) is also a T2 change (see Table 1).

(6) The EPA evaluated LANL-CCP's overall system of controls and found them to be adequate.

The EPA evaluated LANL-CCP's completeness of the sampled AKSRs and general compliance with the AK procedure as evidenced by successful completion of the required forms and found the documents to be complete. LANL-CCP is not overpacking any waste containers for the purposes of payload management.

The WIPP Land Withdrawal Act (Public Law 102-579) (LWA) as amended by Public Law 104-201 identifies that waste identified for emplacement at WIPP must be defense in origin, must not be spent nuclear fuel (SNF) and must not be high-level waste (HLW).[3] The EPA received sample AKSRs and supporting source documents relating to the issue of whether the waste is defense in origin, is not SNF and is not HLW. In these documents, the DOE states that the waste has defense origin and is not SNF or HLW.

Several LANL-CCP AKSRs have drafts under review and/or freeze files in place documenting changes to be implemented during the next review/revision cycle. These change files indicate implementation of a system of controls regarding the AKSR contents. The EPA examined the change files and determined that none of the changes impact characterization.

The overall system of controls also includes the NDA, NDE and WDS controls described in sections 1.0 through 6.5 of this report. The EPA finds that the system of controls in place at the time of this baseline inspection to be adequate for ensuring the long-term isolation of transuranic waste. At the time of the inspection, LANL-CCP was in the process of implementing a new procedure, CCP-PO-045, to formalize and document physical observations of certain LANL waste handling, packaging, and generation procedures being implemented. The procedures subject to this observation will be identified by an SPM and the observations will be documented on CCP-PO-045, Attachment 2 form. The EPA may examine samples of this documentation during a future inspection or evaluation as further evidence of the system of controls.

Any implementation of payload management by LANL-CCP is a T1 change (see Table 1).

Summary of Acceptable Knowledge Tiering Changes

The EPA identified several T1 and T2 requirements, as described throughout section 6.2 and summarized in Table 1. The T1 changes are characterization of SCG S4000 waste and implementation of payload management for any waste stream. The T2 changes for AK are:

- Submission of a list of active LANL-CCP CH AKEs and SPMs that performed work during the previous quarter

[3] See LWA Section 2(10), (15), referring to the Nuclear Waste Policy Act of 1982, 42 U.S.C. § 10101.

- Notification to the EPA upon completion of or substantive modification** to:
    - CCP-TP-005 forms (Attachments 6, 7, 8 and 9) and associated memoranda (i.e., WMP, AK-NDA, add-container memoranda)
    - AK accuracy reports (annually, at a minimum)
    - AK reassessment memoranda and Discrepancy Resolution Reports
    - WSPFs and any associated change notices
    - AKSRs
    - Site procedures requiring CBFO approval
    - Enhanced AK documents such as AKAs (including addition of new figures), CCEMs and BOK memoranda

The language in Table 1 regarding AK documentation applies to all LANL-CCP CH waste streams, unless specifically stated otherwise.

The enhanced AK process, as implemented, provides extensive documentation of LANL's waste treatment and packaging practices and can support LANL-CCP's assessment that the WIPP-bound LANL TRU waste containers as processed no longer exhibit characteristics of ignitability and reactivity – the main cause of the February 2014 WIPP radiation release. In addition to compliance with the enhanced AK determination, all WIPP-bound TRU waste remains subject to DOE's Basis of Knowledge review, a new WIPP requirement. Only upon this determination can LANL-CCP certify LANL TRU waste containers for shipment to WIPP for disposal. This step is beyond the scope of the EPA WIPP regulations at 40 CFR 194.24. However, to show that all DOE TRU waste emplaced meets the post-February 2014 changes to DOE's WIPP TRU waste acceptance criteria, on a quarterly basis, the EPA expects LANL-CCP to submit the relevant documentation (in the form of a spreadsheet) as discussed during the inspection.

When the EPA approves the enhanced AK process, CCP may implement this process at other TRU waste generator sites and the EPA will verify technical adequacy of needed documentation as part of the EPA's continued compliance inspections.

Summary of Acceptable Knowledge Findings and Concerns

The EPA did not identify any AK-related findings or concerns. There are no open issues related to AK resulting from this inspection.

Acceptable Knowledge Baseline Approval

The EPA is approving the AK process for use with SCG S3000 and S5000 waste, including waste from OSRP, as observed during this inspection and in the context of the limitations described in this report. See Table 1 for LANL-CCP CH AK T1 and T2 changes as a result of this baseline inspection.

6.3 Nondestructive Assay

Waste Characterization Element Description

The only operational NDA system within the scope of the EPA's baseline inspection is the HENC 3, located on the HENC Pad in TA-55 at LANL. This NDA system was previously used to assay CH TRU wastes at the Radioactive Waste Management Complex (RWMC) at the Idaho National Laboratory (INL) and was evaluated as part of INL's EPA-approved waste characterization program in November 2005. The HENC 3 was moved to its current location at TA-55 in 2013. Following refurbishment and successful performance testing, LANL-CCP brought the HENC 3 into their waste characterization and the EPA inspected and approved it as a Tier 1 change in 2015.

The HENC 3 NDA system consists of one 4π passive neutron counter and one integral gamma spectrometer system. Prior to beginning operations at LANL, several changes had been made to the system, as detailed in the EPA T1 evaluation report (EPA Docket No. A-98-49; II-A4-199, EPA Air e-Docket No: EPA-HQ-OAR-2001-0012-0456; revised October 7, 2015), including:

- Addition of new filters for the gamma detector.
- Reconditioning of the gamma detector.
- Recalibration of the gamma component to include very dense materials and pipe overpack containers (POCs).
- Addition of a pulser for dead time correction.
- Replacement of the Californium-252 (^{252}Cf) Add-A-Source (AaS).
- Extension of the neutron calibration to 380 g of weapons grade (WG) Pu, 9.05 g Heat Source (HS) Pu (^{238}Pu) and 13.49 g of Material Type 42 (MT[4] 42 or ^{242}Pu).

All changes are described in sufficient detail in LANL-HENC-3-NDA-101, Revision 1.

Following the EPA's T1 approval of the HENC 3 NDA system, LANL conducted additional performance testing to support extending the operating range on the HENC 3 NDA system for HS and MT 42 to 307 g $^{240}Pu_{Effective}$ ($^{240}Pu_{Eff}$) for 55-gallon drums and 461 g $^{240}Pu_{Eff}$ for POCs, as documented in LANL-HENC-3-NDA-101, Revision 3. The $^{240}Pu_{Eff}$ is defined as the amount of ^{240}Pu that would produce the observed true neutron coincidence rate, after correcting for the neutron moderation properties of the waste matrix.

The use of any new NDA equipment other than the HENC 3 to assay CH TRU waste is a new T1 change (See Table 1).

There are no concerns regarding the operational history and current hardware and software configurations of the LANL HENC 3 system.

[4] Material Types or MTs are LANL designations that indicate specific isotopic profiles for accountable nuclear materials. For example: MT 52 indicates WG Pu, essentially 6% ^{240}Pu; MT 83 indicates specific percentages of HS Pu, typically an enrichment of 80% ^{238}Pu; and, MT 42 indicates Pu enriched in ^{242}Pu in a range of concentrations.

6.3.1 Measurement Geometries

Based on the HENC 3's calibration and performance testing that the EPA evaluated during this baseline inspection, the HENC 3 is configured for two measurement geometries:

- 55-gallon drums of CH TRU wastes.
- 12" POCs of CH TRU wastes.

These two geometries are the same as those observed during EPA's initial T1 evaluation in 2015.

The HENC 3 is calibrated in terms of relevant matrix attributes, specifically: density and photon energy for the gamma modality; and, moderation, multiplication and absorption for the passive neutron modality. Accordingly, the gamma and neutron operating ranges are expressed in terms of these as opposed to the delineation of SCG (i.e., S3000, S4000 and S50000), which may be relevant to AK or NDE but is generally not applicable to NDA systems.

During the EPA's initial T1 evaluation of the HENC 3 in 2015, LANL-CCP personnel stated that there were plans to assay CH TRU waste in criticality control overpacks (CCOs)[5]. However, during the baseline inspection LANL-CCP did not provide objective evidence of performance testing for this measurement geometry. As a result of this baseline inspection, the EPA is proposing to approve the HENC 3 to assay CH TRU waste in 55-gallon drums and 12" POCs. Use of the HENC 3 to assay CH TRU waste in any container type other than a 55-gallon drum and 12" POC is a new T1 change (see Table 1).

There are no concerns regarding the HENC 3 for assaying 55-gallon drums and 12" POCs of CH TRU waste.

6.3.2 Design and Operation

The LANL HENC 3 system incorporates two measurement modalities—a passive neutron counter and an integral gamma-ray spectrometer. The passive neutron counter uses multiple ^{3}He proportional counters, along with a multiplicity shift register and an external ^{252}Cf source for the AaS matrix correction function, to determine the spontaneously fissioning mass content of waste containers, i.e., the $^{240}Pu_{Eff}$. The quantities of individual radionuclides are related to the $^{240}Pu_{Eff}$ by applying the ratios of other TRU or target radionuclides, including all spontaneously fissioning radionuclides (i.e., ^{235}U). Sample-specific matrix corrections are provided via the AaS method using a ^{252}Cf source that interrogates a waste container's matrices.

Isotopic ratios are determined primarily by: Multi Group Analysis (MGA) of the gamma-ray spectrum obtained with the system's integral gamma-ray spectrometer; approved AK, when appropriate; and FRAM[6]. The system is operated from Canberra Genie 2000 Version 3.0 and NDA 2000 Version 4.0 software platforms. The system's broad energy germanium detector

[5] CCOs are containers designed to hold high gram value Pu-bearing materials in a solid matrix and are comparable to POCs that have been used at LANL and other sites.

[6] FRAM is an initialization for Fixed-Energy Response Function Analysis with Multiple Efficiencies, a commonly used software analysis routine for the purpose of determining isotopic ratios similar to MGA, also called PC FRAM.

acquires the gamma-ray spectrum to be analyzed by MGA (or FRAM) and provides direct quantification of ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Pu, ^{241}Am, ^{233}U, ^{235}U, ^{238}U, ^{137}Cs, and ^{237}Np. The gamma spectrometer uses a multi-curve efficiency calibration based on waste density to correct for variations in matrix density and photon attenuation. Dead time corrections are provided with a pulser set at approximately 1150 kiloelectron volt (keV) and a count rate of 100 counts per second (cps), one of the newly-added aspects following the system's relocation to LANL.

The HENC 3 has two operational modes, as follows:

- Passive neutron mode with an operational range of the system's lower limit of detection (LLD) to 380 g WG Pu (^{239}Pu), 9.05 g of ^{238}Pu for HS Pu and 13.49 g for ^{242}Pu using gamma-based or approved AK isotopics; this was confirmed by measurements in three operational ranges: LLD to 127 g; 128 g to 256 g; and, 257 g to 380 g.
- Gamma mode with an energy calibration of 59 to approximately 1500 keV and an efficiency calibration limited by spectral attributes (e.g., peak shape) and dead time, and an operational mode of 0.01 to 2.5 g/cc in terms of matrix density.

The EPA personnel observed the HENC 3's calibration and operation at TA-55. All personnel listed in the TA-55 HENC3 operational were on the current List of Qualified Individuals (LOQI) (dated February 9, 2017), and the operator had the current revisions of the appropriate HENC 3 operation procedures available in the HENC 3 control room. Four CCP Standing Orders and three Operator Aids were posted in the HENC 3 control room. Substantive physical modification to the HENC3 is a new T1 change (See Table 1).

There are no concerns regarding the design and operation of the passive neutron and gamma modes of the HENC 3.

6.3.3 Gamma Calibration, Calibration Verification and Calibration Confirmation, and Determination of Measurement Ranges and Operational Status

The HENC 3 gamma detector was ISOCS[7] calibrated at the Canberra Facility in Meriden, CT, and was verified and confirmed at LANL using NTP- and/or PDP-type[8] PuO_2 sources as documented in Sections 5 and 6 of Revisions 1 and 2 of the HENC 3 calibration report. All calibration sources are traceable to the national standards base, and a copy of the certificate for each source was included in the calibration report. The initial calibration confirmations and verifications of the HENC 3 were successful, as shown in Tables 5, 6a, 6b, 7a and 7b of Revision 1 of the calibration report. This was unchanged from the EPA's initial approval of the HENC 3

[7] ISOCS is the In-Situ Object Counting System, a Canberra-specific approach to characterizing the response of a gamma detector to a wide range of radionuclide concentrations and spatial configurations (geometries). This characterization is the formal calibration of the gamma detector and is performed at the factory in Meriden, CT, using the ISOCS method. This calibration is verified and confirmed by LANL-CCP on site, as part on the HENC 3 NDA system.

[8] PDP is the CBFO-sponsored NDA Performance Demonstration Program and NTP is the National TRU Program. The terms "PDP-type" and "NTP-type" refer to program-specific criteria for Pu sources used for calibration and performance testing of NDA systems, i.e., WG or HS PuO_2 in diatomaceous earth encapsulated in double or triple walled stainless steel cylinders that were fabricated by the LANL CMR Analytical Chemistry Group (now called the LANL Analytical Chemistry Group) expressly for use in NDA calibration and performance testing.

in 2015. In October, 2015, LANL-CCP performed additional calibration confirmations to support the 307 g and 461 g $^{240}Pu_{Eff}$ limits of the operating range for 55-gallon drums and POCs, respectively, as documented in Revision 3 of the calibration report

LANL-CCP performed four calibration verifications between the initial approval in 2015 and this baseline inspection, three in 2016 and one in 2017, discussed below. LANL-CCP took the HENC 3 out of service on October 31, 2016, and it was returned to operational status on January 4, 2017, as documented by a successful calibration verification performed in January 10, 2017. This last calibration verification was documented on pages 4 and 5 of the HENC 3 operational logbook.

The gamma operating range for this system is not a mass calibration in the strict sense; that is, as presented in ASTM C 1133, there is no true upper mass limit for the gamma calibration of the HENC 3. The calibration specifies a range in terms of photon energy and all assays within that energy range that meet performance criteria with respect to transmission, dead-time, peak shape, and resolution should be acceptable, regardless of the sample's nuclear material content. The HENC 3 operational ranges and specific limitations for the gamma mode are as follows: for weapons grade (WG) and heat source (HS) Pu in 55-gallon drums and POCs, the system's range is from the LLD to an upper range limited by spectral attributes, as discussed above. In terms of matrix, the bulk sample density range is 0.01 to 2.50 g/cc, with the option to exceed these at the discretion of the LANL-CCP Expert Analyst (EA). The gamma emission of ^{242}Pu is weak and HENC 3 gamma measurements of MT 42 measurements in 55-gallon drums and POCs are not allowed. Extension of or changes to the HENC 3's approved calibration ranges is a new T1 change (See Table 1).

HENC 3 assays for POCs near 100 nCi/g are not acceptable. HENC 3 assays for debris, sludge and cement near 100 nCi/g should be gamma only; neutron values for debris must be greater than 100 nCi/g; neutron values for sludge and cement are marginal. ^{242}Pu values must be passive neutron only, gamma ^{242}Pu values are not allowed. All HENC 3 gamma and neutron assays are subject to evaluation by the EA.

There are no concerns regarding the gamma calibrations, verifications, confirmations, the establishment of the measurement ranges and the operational status of the LANL HENC 3.

6.3.4 Neutron Calibration, Verification and Confirmation, and Determination of Operational Ranges

In 2004, CCP performed the passive neutron calibration of record for the HENC 3 at Lawrence Livermore National Laboratory in California, using combinations of WG Pu sources and surrogate drums containing non-interfering and combustibles matrices. INL-CCP verified the passive neutron calibration upon the system's relocation to INL in 2005, as documented in CCP-INL-HENC-001, which the EPA evaluated in 2005 (see Docket No. A-98-49; II-A4-60). LANL-CCP verified the HENC 3 passive neutron calibration in 2014, as described in EPA Docket No. A-98-49; II-A4-199, EPA Air e-Docket No: EPA-HQ-OAR-2001-0012-0456; revised October 7, 2015. All verification and confirmation measurements are documented in the HENC 3 calibration report and all measurements met the acceptance criteria for precision and accuracy, as shown in Tables 5, 6a, 6b, 7a and 7b of Revision 1 of the calibration report.

LANL-CCP was unable to obtain ^{242}Pu sources for the passive neutron confirmation and instead developed ^{242}Pu operational ranges based on the equivalence of the ^{242}Pu passive neutron signature to that of ^{238}Pu and ^{240}Pu. Based on these measurements, LANL-CCP developed the following operational ranges for the HENC 3 passive neutron mode, as follows:

- For WG Pu in 55-gallon drums and POCs: the system LLD to 380 g Total Pu.
- For HS Pu and MT 42 in 55-gallon drums: the system LLD to 9.05 g ^{238}Pu (307 g $^{240}Pu_{Eff}$), or approximately 152 g of Pu Total for a HS enrichment of 80%
- For HS Pu and MT 42 in POCs: the system LLD to 13.49 g ^{242}Pu 9.05 g (461 g $^{240}Pu_{Eff}$), or approximately 228 g of Pu Total for a HS enrichment of 80%.

All verification and confirmation measurements are documented in Revision 1, 2 and 3 of the HENC 3 calibration report and all measurements met the acceptance criteria for precision and accuracy.

There are no concerns regarding the passive neutron calibration, verification, confirmation and establishment of LANL HENC 3.

6.3.5 Ability to Quantify WIPP-Tracked Radionuclides

Instructions for calibration and operation of the LANL HENC 3 are contained in CCP-TP-108 and CCP-TP-107, respectively. These procedures delineate responsibilities of the NDA Operator, Lead Operator, and EA, and provide direction for system start-up, calibration, routine waste drum assay, and system shutdown. The combination of isotopic information (from MGA, FRAM or approved AK), and the passive neutron-based $^{240}Pu_{Eff}$ determination or direct gamma measurement provides quantification of ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Am, ^{237}Np, ^{233}U, ^{235}U, ^{238}U, and ^{137}Cs. The ^{242}Pu content is determined using the correlation technique of Gunnink[9] that the EPA has evaluated previously. Each waste container's ^{234}U content is quantified by application of scaling factors based on the container's observed values for ^{235}U and ^{238}U. The determination of ^{90}Sr is performed by application of a scaling factor based on the drum's observed ^{137}Cs content. AK-based isotopics may be used when such assignments are appropriately supported by LANL's EPA-approved AK process and LANL-CCP has three approved AK isotopic sets: AK 4, AK 6 and AK 9.

There are no concerns regarding the ability of the LANL HENC 3 to quantify the 10 WIPP-tracked radionuclides or assign isotopic distributions pertinent to CH TRU wastes in 55-gallon drums and 12" POCs.

6.3.6 Lower Limit of Detection Determination

The LLD[10] is defined in CCP-PO-002, "CCP Transuranic Waste Certification Plan," as:

[9] Gunnink, R. "Use of Isotope Correlation Techniques to Determine ^{242}Pu Abundance." *Nuclear Materials Management* 9, no. 2 (1980): 83–93.

[10] For purposes of this report, the LLD is equivalent to the Minimum Detectable Concentration (MDC), which is derived by dividing the measurement system's detection limit (expressed as activity in Curies) by the mass

That level of radioactivity which, if present, yields a measured value greater than the critical level with a 95% probability, where the critical level is defined as that value which measurements of the background will exceed with 5% probability.

The LANL HENC 3 will be used to discriminate TRU and non-TRU wastes, requiring that the system's LLD be less than 100 nCi/g of TRU alpha activity concentration (TAAC) of waste and that it be documented and technically appropriate. Section 7 of the HENC 3 calibration report documents typical minimum detectable concentration (MDC) values for both passive neutron and gamma modalities for sludge, glass, combustibles, metals and cement for 55-gallon drums. The MDC for POCs is reported based on an empty container, i.e., one that contains only rigging, pipe and packing material. LANL-CCP determined HENC 3 MDCs for five matrices and POCs, as listed in Tables 8A and 8b. Based on these data, the following limitations apply to the HENC 3:

- For debris, sludge and cement wastes in 55-gallon drums, only the gamma-based measurements should be used for containers near 100 nCi/g TAAC, at the discretion of the EA.
- For POCs near 100 nCi/g TAAC, the HENC 3 cannot provide technically reliable data, as determined for individual assays by the EA.

As stated above, HENC 3 assays for POCs near 100 nCi/g are not acceptable. HENC 3 assays for debris, sludge and cement near 100 nCi/g should be gamma only; neutron values for debris must be greater than 100 nCi/g; neutron values for sludge and cement are marginal. ^{242}Pu values must be passive neutron only, gamma ^{242}Pu values are not allowed. All HENC 3 gamma and neutron assays are subject to evaluation by the EA.

With the exception of the limits shown in the preceding paragraph, the ability of the HENC 3 to discriminate TRU and Non-TRU at the 100 nCi/g TAAC criterion is acceptable. Reporting thresholds (LLD or MDC analogs) are based on known relationships between measured radionuclides ($^{238, 239, 240}$Pu, ^{235}U and ^{137}Cs) and other target radionuclides that cannot be practically measured in this context (^{242}Pu, ^{234}U and ^{90}Sr). Specifically: a reporting threshold for ^{234}U is based on observed ^{235}U, ^{238}U and ^{238}Pu values; a reporting threshold for ^{90}Sr is derived by to observed ^{137}Cs values; and, ^{242}Pu values are derived based on the observed ^{239}Pu and ^{240}Pu values.

There are no technical concerns regarding the technical derivation and application of MDCs and reporting thresholds relative to the LANL HENC 3.

6.3.7 Total Measurement Uncertainty

The determination of the Total Measurement Uncertainty (TMU) for the LANL HENC 3 is documented in LANL-HENC3-TMU-101, April 24, 2014. Upon review of the TMU report, the EPA determined that the TMU determination for the HENC 3 is unchanged from what was

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of the item being measured (in grams). This yields a value in nCi/g, which, while technically different from the LLD in a strict sense, achieves the same purpose; this report uses the terms *LLD* and *MDC* interchangeably.

inspected and approved during the initial T1 approval in 2015. LANL-CCP's determination of TMU for the HENC 3 is technically adequate and appropriately documented.

There are no technical concerns regarding the technical adequacy and documentation of TMU relative to the LANL HENC 3.

6.3.8 Replicate Assays

The purpose of the replicate testing performed as part of this inspection is to provide EPA with an independent means to verify that the HENC 3 can provide reproducible results for the determination of the quantity of 10 WIPP-tracked radionuclides (^{241}Am, ^{137}Cs, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{90}Sr, ^{233}U, ^{234}U and ^{238}U) and the TAAC.[11] This is accomplished by having the HENC 3 reassay drums it previously measured to demonstrate the system's ability to do the following:

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

As part of this inspection, the EPA requested that LANL-CCP reassay three containers that EPA randomly selected from a list of drums previously assayed on the HENC 3. The HENC 3 reassayed CH TRU container Nos. 67820, 67772 and 67243 five times, and the results were compared to the original assay data. Two statistical tests, a χ^2 test and a t-test, were performed on these data and the data and results are included in Attachments D.1, D.2 and D.3. The χ^2 test, also known as the goodness-of-fit test or the chi-squared test for independence, is used to show how observed data compare with data we would expect to obtain according to a specific hypothesis. EPA applied it in this instance to show whether the replicate measurements differed from the expected original measurement. The t-test is used to tell if two sets of data are statistically different from one another. EPA applied it to the replicate data to see if there are statistically significant differences between the original assay values and the average of the five replicate measurements.

The χ^2 test results for Drum Nos. 67820, 67772 and 67243 showed that the observed variances in the replicate measurements are less than or equal to the reported uncertainties within the statistical limits of the test. The t-test results for Drum Nos. 67820, 67772 and 67243 also showed no statistically significant differences between the original assay values and the average of the five replicate measurements.

There are no concerns regarding replicate testing of Drums Nos. 67820, 67772 and 67243 on the HENC 3 and the successful execution of the EPA replicate testing protocol.

[11] Revision 2 of the Environmental Protection Agency Replicate Testing Protocol provides the details of the replicate testing assay protocol and data evaluation.

Summary of Nondestructive Assay Tiering Changes

The EPA identified several T1 and T2 requirements, as described throughout section 6.3 and summarized in Table 1. The T1 changes are:

- New equipment of substantive physical modification to approved equipment and extension of or changes to approved calibration ranges for approved equipment.
- The use of waste containers other than 55-gallon drums or 12" POCs.

The T2 changes for NDA are:

- Submission of a list of active LANL-CCP NDA operators, EAs and ITRs that performed work during the previous quarter
- Notification to the EPA upon substantive modification to:
    - Software for approved equipment.
    - Operating ranges upon CBFO approval.
    - Site procedures requiring CBFO approval.

Summary of Nondestructive Assay Findings and Concerns

The EPA did not identify any findings or concerns related to use of the HENC 3.

Nondestructive Assay Baseline Approval

The EPA is approving the HENC-3 NDA system at TA-55 in the configuration observed during this inspection to characterize CH TRU waste, consistent with the limitations described in this report. See Table 1 for all applicable LANL-CCP CH NDA T1 and T2 changes.

6.4 Visual Examination

Technical Evaluation

The EPA evaluated LANL-CCP's VE procedures for CH waste characterization. LANL-CCP was previously approved for CH VE for SCG S5000 (heterogeneous debris) waste and SCG S3000 (homogeneous solids), and the scope of this baseline inspection consisted of these two SCGs.

LANL-CCP routinely performs CH VE at three locations, TA-55, the CMR Facility and under the OSRP. During this baseline inspection, the EPA observed LANL-CCP personnel conducting CH VE at both TA-55 and at the CMR Facility. Consistent with the waste characterization practices at other TRU generator sites operated by CCP, LANL-CCP personnel observe LANL site personnel who perform the hands-on VE, i.e., LANL VE staff actually remove, unpack and repackage the waste items. LANL-CCP VE personnel work closely with the site's VE staff and record all pertinent data as the site VE personnel handle the waste items. During this baseline

inspection, the EPA also interviewed OSRP CH VE personnel and evaluated training records for all LANL CH VE personnel, i.e., TA-55, CMR Facility and OSRP.

(1) EPA examined visual examination characterization records and found them to be adequate.

The EPA reviewed BDR No. LAVE030063, a 55-gallon drum containing S5400 CH TRU waste for which the EPA had observed the VE process at the CMR Facility, as discussed below. LANL-CCP completed final review of the BDR on February 15, 2017, and provided it to the EPA following the on-site inspection at LANL. The EPA determined that characterization records were complete and had been properly processed. No NCRs had been generated for this BDR.

There were no concerns regarding the CH TRU VE characterization records for LANL-CCP.

(2) EPA examined contact-handled visual examination training records and found them to be adequate.

Training for all LANL-CCP personnel was current, including readings/indoctrination and On-the-Job-Training practical requirements, based on Qualification Packages that LANL-CCP provided for review during this baseline inspection. All LANL-CCP CH VE personnel were listed on the LOQI dated February 9, 2017 and EPA reviewed training records in detail for selected operators. Appendix F contains a complete list of TA-55, CMR Facility and OSRP VE personnel. The EPA determined that CH TRU VE operators had been adequately training and their training records were readily available.

Submission to EPA of a list of all VE personnel who performed work during the previous quarter remains a VE T2 change (see Table 1). Specifically, the list must include all VE operators, ITRs and VEEs to ensure that the EPA has a complete picture of LANL-CCP waste characterization activities and potentially inform the scope of future T1 change evaluations.

There were no concerns regarding the CH TRU VE training records for LANL-CCP personnel.

(3) The EPA observed contact-handled visual examination at Technical Area 55 and the Chemical and Metallurgical Research Facility and found it to be adequate.

The EPA observed LANL-CCP conduct VE for S5400 CH TRU waste at in Wing 5 and 7 in the CMR Facility. Following CCP-TP-113, Revision 20, LANL-CCP VE personnel observed LANL CMR Facility personnel performing an indirect load, i.e., they unpacked waste in Room 5128, transferred it to a 20-gallon interim storage container No. ENV7155 in Room 511. The container was secured with a Tamper Indicating Device (TID), as required. Waste items consisted of plastic bags of small containers and pipettes generated from fume hoods designated for Pu processing. LANL-CCP VE personnel noted and recorded pertinent aspects of each waste item.

The EPA also observed LANL-CCP conduct VE for S5400 CH TRU waste in Room 129 of the Plutonium Facility at TA-55, known as PF4. Following CCP-TP-113, Revision 20, LANL-CCP VE personnel observed LANL personnel remove items from Glove Box No. 49304, which was then bagged out and placed in a 55-gallon drum. VE personnel compared each item against a list

of prohibited items and recorded pertinent aspects of each waste item. Waste items consisted of empty vials, small metal items, and used gloves from glove box operations. The absence of lead was confirmed by a look-up table of serial numbers, indicating which numbers did and did not contain lead. The tare weight of the 55-gallon waste drum was established using Mobile Drum Scale MBCEQ-LFT G14503, and a preoperational weight check was performed on the scale.

There were no concerns regarding the performance of VE for CH TRU waste at LANL.

Summary of Visual Examination Tiering Changes

The EPA identified several T1 and T2 requirements, as described throughout section 6.4 and summarized in Table 1. The T1 change is implementation of any VE process for SCG S4000 waste. The T2 changes for VE are:

- Submission of a list of LANL-CCP VE operators, VE Experts and ITRs that performed work during the previous quarter.
- Notification to the EPA upon substantive modification to site procedures requiring CBFO approval, including OSRP VE technique procedure.

Summary of Visual Examination Findings and Concerns

The EPA did not identify any findings or concerns related to VE during this baseline inspection.

Visual Examination Baseline Approval

The EPA is approving the VE process as observed during this inspection and in the context of the limitations described in this report. See Table 1 for the applicable LANL-CCP CH VE T1 and T2 changes.

6.5 WIPP Waste Data System

WDS is a component in the WIPP data system for tracking individual TRU waste containers and waste contents destined for WIPP disposal and identifying the controls used to characterize contents of the individual waste containers. It is a web-based software system used by WIPP to gather, store and process information pertaining to TRU waste, including uploading individual container data, creating payloads using the uploaded containers and planning shipments using the approved payloads (Reference DOE/WIPP-09-3427). WDS incorporates several checks to ensure that only containers meeting WIPP acceptance criteria can be added to payloads and all scheduled shipments will meet U.S. Department of Transportation shipping requirements. As WIPP incorporates additional requirements in the acceptance criteria, the WDS is updated to incorporate those checks. Recent WDS updates added several checks to ensure that each container added to a payload meets the new requirements of the revised waste acceptance criteria (Reference DOE/WIPP-02-3122), including insuring that each container added to a payload has an approved CCEM and either an approved AKA or Attachment 9 form (see descriptions in section 7.1 above). Containers that do not meet both criteria cannot be added to a payload and therefore cannot be emplaced at WIPP.

During the onsite portion of this baseline inspection, the EPA observed a demonstration of WDS performing the checks for CCEMs using dummy data. The WDS user demonstrated that the system would not allow creation of a payload including a container without an associated approved CCEM. The WDS user then modified the container record to add the CCEM association and demonstrated that the payload could be successfully created.

Prior to releasing a WDS update, the software quality assurance team conducts acceptance testing to ensure proper performance. The EPA reviewed documentation of this testing, including the Acceptance Test Report and screenshots supporting successful completion of three test cases. These three test cases verified functionality of the AKA date check and several system checks for CCEMs for all inner containers upon submittal of an overpack, for all inner containers upon submittal of a remote-handled canister, and for inner containers for a payload submittal. The EPA also examined test results showing successful payload generation. WDS output for each container in the test payload demonstrated that each container was associated with a CCEM and had an AKA date prior to than the added-to-payload date.

Based on the demonstration and objective evidence examined, The EPA determined that the WDS controls adequately ensure that only fully characterized and certified TRU waste containers can be emplaced at WIPP.

7.0 RESPONSE TO PUBLIC COMMENTS

The EPA did not receive any public comment specific to this approval.

8.0 SUMMARY OF RESULTS

8.1 Environmental Protection Agency Findings and Concerns

EPA did not identify any findings or concerns during this inspection.

8.2 Conclusions

This approval is based on the EPA's baseline inspection conducted on February 7–9, 2017, in Los Alamos, New Mexico. The EPA evaluated the LANL-CCP's CH TRU waste characterization program for solid and debris waste and determined it to be technically adequate. The approval includes:

(1) The Acceptable Knowledge process for LANL CH TRU debris and solid waste, including the enhanced Acceptable Knowledge process.

(2) The HENC 3 NDA system for characterizing CH TRU waste at TA-55.

(3) The Visual Examination process to identify waste material parameters (WMPs) and the physical form of CH TRU debris and solid waste at TA-55 and the CMR Facility.

LANL-CCP will prepare enhanced AK documentation for OSRP waste prior to shipment to WIPP. However, the EPA concludes that the enhanced AK process is unlikely to significantly change the overall OSRP system of controls due to the nature of the sealed sources as described in the original OSRP approval (see EPA Docket No. A-98-49, II-A4-55, June 2005).

Although not a formal part of the LANL baseline approval, the EPA did evaluate the efficacy of the WDS controls to adequately ensure that only fully characterized and certified TRU waste containers can be emplaced at WIPP.

The EPA is specifically not including any waste characterization activities taking place at TA-54 in the approval. Any changes to the waste characterization activities from the date of the baseline inspection must be reported to and, if applicable, approved by the EPA, according to Table 1. All T1 changes, including resumption of waste characterization activities at TA-54, must be submitted for approval before their implementation and will be evaluated by the EPA. Upon approval, EPA will post the results of the evaluations through the EPA website and the WIPPNEWS list. LANL-CCP must submit T2 changes that have been implemented four times a year at the end of each fiscal quarter.

ATTACHMENT A: BASELINE INSPECTION PERSONNEL LIST

Personnel Name	Organization	VA Meeting	Entrance Meeting
Ed Feltcorn	EPA HQ	✓	✓
Rajani Joglekar	EPA HQ	✓	✓
Patrick Kelly	SC&A/EPA	✓	✓
Kira Darlow	SC&A/EPA	✓	✓
Adrienne Nash	NA-LA		✓
Becky Coel-Roback	LANL OSRP		✓
Carolina Soaterna	NWP/CCP		✓
Connie Walker	LANL-CCP	✓	
Dale Simpson	CCP-NDE		✓
Don Allen	WD-WPE		✓
Ed Gulbransen	NWP/CCP	✓	✓
Edgard Espinosa	DOE	✓	
Farok Sharif	NWP/NTP	✓	✓
Gary D. Chism	NWP/CCP		✓
Herb Cruickshank	DOE CBFO	✓	✓
Ioanna Witkowski	LANL OSRP		✓
Jackie Hurtle	WM-DO		✓
Jay Santillan	EPA		✓
Jerry McAlpi	LANL OSRP		✓
Jim Schoen	NWP/CCP		✓
Joe P. Harvill	NWP/NTP		✓
Joe Wachter	Canberra		✓
Justin Griffin	LANL/OSRP		✓
K. Lacy	NPI-7		✓
Karen Armigo	NA-LA		✓
Kiki Torres	ADEM		✓
Michael Simmons	CCP-FGA		✓
Michael Walentine	NWP/NTP		✓
Mike Marquez	NPI-7		✓
Mike Papp	NWP/CCP	✓	✓
Pete Carson	NPI-7		✓
Phil Hypes	NPI-7		✓
Ranada Baca	CCP		✓
Richard Jagielski	CCP-FGA		✓
Rick Castillo	CTAC/CBFO		✓
Shelly Martinez	NWP/CCP		✓
Sheri Nance	CCP AK		✓
Steve Schafer	LANL-CCP	✓	
Terri-Anne Groover	CCP		✓
Tim Barton	CCP-NDA LANL		✓
Trey Greenwood	TechSpecs AK	✓	✓

ATTACHMENT B: ACCEPTABLE KNOWLEDGE BASELINE INSPECTION CHECKLIST

EPA Inspection No: LANL-CCP-Baseline-2017 **Inspection Date: February 7–9, 2017**

Does the waste characterization program adequately define, describe, address or satisfy the following:	Yes, No, NA	Objective Evidence and Comments
1) Personnel		
1-1) Are all AKEs and SPMs performing work for LANL-CCP trained and qualified?	Yes	AKE Qualification Cards for J. Kleckner (10/25/16), S. Nance (10/26/16), M. Papp (10/26/16), L. Watson (2/6/17), S. Schafer (10/25/16), J. Schoen (10/27/16), C. Walker (10/26/16) SPM Qualification Cards for T. Groover (12/4/14), J. Knox (10/23/13), C. Soaterna (5/31/11), D. Wade (10/23/13), R. Whiteaker (5/3/12), R. Whitely (10/31/13) Assigned Reading for all AKEs and SPMs: CCP-TP-005, Rev. 29 Assigned Reading for all SPMs: CCP-TP-002, Rev. 26; CCP-TP-200, Rev. 1 The AKE Qualification Cards were redesigned after release of the WIPP WAC, Revision 8, and therefore all AKEs have new qualification cards. All AKEs except C. Walker were previously qualified as AKEs and were qualified prior to doing any work for LANL-CCP.
2) Acceptable Knowledge Nonconformances and Discrepancies		
2-1) Are AK-affecting nonconformances documented appropriately such that adequate resolution is attained prior to continued container characterization and/or shipment?	Yes	NCR-LANL-0138-16, NCR-LANL-0156-17 Both NCRs were issued to control further characterizing of containers holding POCs that contain combustible material. The POCs were previously allowed at WIPP and therefore the containers were added to the AKTSS. However, the WIPP WAC, Rev. 8, disallowed the POCs containing combustibles. The NCRs hold the containers pending future resolution (e.g., reallowance or remediation).
2-2) When appropriate, is AK re-evaluation adequately completed and documented? This may be documented on a CCP-TP-005, Att. 10, Acceptable Knowledge Re-evaluation Checklist.	Yes	There have not been any Attachment 10 forms generated in the last several years (since 2014). None of the reviewed discrepancy resolutions or enhanced AK indicated the need to do an AK re-evaluation.
2-3) Are discrepancies between AK source documents and/or between AK and characterization data documented and resolved? This may be documented on a CCP-TP-005, Att. 11, Acceptable Knowledge Source Document Discrepancy Resolution.	Yes	CCP-AK-LANL-004: DR139, DR140, DR141 CCP-AK-LANL-010: DR149 EPA reviewed a sample of DRs generated since 2014. They related to discrepancies in assigned EPA HWNs based on comparison of AK for different waste streams and discrepancies in waste SCG between that expected based on AK and that found in quick-scan radiography. None indicated a need to revise the AKSR.

Does the waste characterization program adequately define, describe, address or satisfy the following:	Yes, No, NA	Objective Evidence and Comments
3) Waste Stream Definition and Waste Identification		
3-1) Is all waste within a waste stream generated from a single process/activity and does the AK adequately describe the single process/activity?	Yes	CCP-AK-LANL-004, Rev. 11; CCP-AK-LANL-006, Rev. 13; CCP-AK-LANL-008, Rev. 9; CCP-AK-LANL-010, Rev. 6 The AK adequately supports that each waste stream described in the above four AKSRs was generated by a single process/activity.
3-2) Is all waste within a waste stream similar in material and physical form and are the expected physical parameters adequately described? The expected physical parameters may be documented on a CCP-TP-005, Att. 6, Waste Form, Waste Material Parameters, Prohibited Items, and Packaging, and/or the associated memorandum.	Yes	LA-CIN01.001, Att. 6 and memo, 12/2/13; LA-MHD01.001, Att. 6 and memo, 1/2/14; LA-OS-00-01.001, Att. 6 and memo, 7/18/12; LA-MHD04.001, Att. 6 and memo, 6/10/14; LA-MIN03-NC.001, Att. 6 and memo, 6/12/14; LA-MHD09.001, Att. 6 and memo, 6/13/14 The expected physical characteristics are adequately described in the AK on CCP-TP-005, Att. 6s and associated WMP memoranda. The limited characterization conducted by LANL-CCP since 2014 has not generated data that would change the expected characteristics; therefore, it is reasonable that the Att. 6s and memoranda have not been revised.
3-3) Are the expected radiological characteristics for each waste stream adequately described in the AK and are the limitations of AK for use in radiological characterization or assay adequately communicated? The radiological characteristics and AK limitations may be documented on a CCP-TP-005, Att. 7, Radionuclides, and/or the associated AK-NDA memorandum.	Yes	LA-CIN01.001, Att. 7 and memo, 1/2/14; LA-MHD01.001, Att. 7 and memo, 1/6/14; LA-OS-00-01.001, Att. 7 and memo, 11/20/13; LA-MHD04.001, Att. 7 and memo, 6/10/14; LA-MIN03-NC.001, Att. 7 and memo, 9/8/11; LA-MHD09.001, Att. 7 and memo, 6/11/14 The expected radiological characteristics are adequately described in the AK on CCP-TP-005, Att. 7s and associated AK-NDA memoranda. The limited characterization conducted by LANL-CCP since 2014 has not generated data that would change the expected characteristics; therefore, it is reasonable that the Att. 7s and memoranda have not been revised.
3-4) Are waste containers traceable from retrieval or generation through LANL-CCP's WIPP characterization process? Traceability records may include add-container memoranda (may include CCP-TP-005, Att. 8, Waste Containers List), drum-specific paperwork from the generator site, IWMDLs, characterization BDRs, WDS screenshots or demonstrations.	Yes	67336: M368 (WPF), M387 (TWSR), LANL-CCP RTR record from LA-RTR2-13-0101 S822683 (child: 93967): M367 (WPF), M387 (TWSR and RSWD), M315 (repackaging paperwork), LANL-CCP RTR record for 93967 from LA-RTR2-13-0153 S824091 (children: 69190, 69267, 69330, 69332): M367 (WPF), M422 (TWSRs and RSWD), M315 (repackaging paperwork), LANL-CCP RTR records from LA-RTR2-14-0015 (69190, 69267) and LA-RTR2-14-0016 (69330, 69332)
4) Enhanced Acceptable Knowledge		
4-1) Has review of the AK associated with certifiable payload	Yes	LA-CIN01.001, Att. 9, 1/9/17; LA-MHD01.001, Att. 9, 1/26/16, 4/18/16, 1/9/17;

Does the waste characterization program adequately define, describe, address or satisfy the following:	Yes, No, NA	Objective Evidence and Comments
containers generated since August 25, 2016, been conducted and documented to provide reasonable assurance that management and packaging of the containers is bounded by the applicable AKSRs? This may be documented on a CCP-TP-005, Att. 9, Interface Waste Management Documents List, on the CCP-TP-005, Att. 3, Acceptable Knowledge Source Document Summary for each document listed on the Att. 9 and/or in a new revision of the AKSR.		LA-MIN02-V.001, Att. 9, 1/18/17; LA-MIN04-S.001, Att. 9, 1/19/17; LA-MHD03.001, Att. 9, 1/18/17; LA-OS-00-01.001, Att. 9, 1/31/17 LANL-CCP SD Library: C225, P089, P096, P099, P101, P236, P333, P335, P336, P347, P348, P351 LANL-008 SD Library: D051, D052, P001, P002, P008, P009, P010, P011, P012, P013, P014, P015 AKTSS, 1/31/17 LANL-CCP has generated several Att. 9s without adding any containers to the AKTSS based on those Att. 9s. The container management and packaging procedures identified on the Att. 9s listed above are bounded by the applicable AKSR. Packaging dates for all containers added to the AKTSS using an Att. 9 are bounded by procedures listed on the Att. 9 or by previous revisions of those procedures. If the container packaging date corresponds to an earlier version of the procedure, the AKE evaluated the previous revision(s) (documented on the associated Att. 3) to ensure that the AK is bounding. Any containers added to the AKTSS without an Att. 9 date regardless of the generation date will be examined using the AKA process. EPA finds this process adequate to ensure container packaging and management is bounded by the AK.
4-2) Has review of the AK associated with certifiable payload containers generated prior to August 25, 2016, been conducted and documented to provide reasonable assurance that management and packaging of the containers is bounded by the applicable AKSRs? This may be documented in an AKA; there may be more than one AKA per waste stream.	Yes	AKA01 (Figure 1), AKA02 (Figure 1), AKA03 (Figure 1), AKA04 (Figure 1), C371, C372 DRRs and final drafts for AKA01 and AKA02 LANL-CCP SD Library: M424 EPA found the AKA conclusions to be logical and reasonable and the document review process to be complete. The AKE walked EPA through the decision process for including containers on the AKAs using the containers and documentation identified in Checklist Item 3-4, above. The management and packaging of the containers added in the above cited AKAs is bounded by the applicable AKSR.
4-3) Are the technical assumptions used to evaluate the chemical compatibilities within a waste stream clearly documented and reasonable and/or justified? Is the overall evaluation sufficient to identify any potential impacts to the long-term isolation of TRU waste?	Yes	C373, CCE01, CCE04, CCE05, CCE06 DRRs and final drafts for CCE04 and CCE06 C344, C375, C386, D090, D123, D140, D262, D263, D264, D265, D266, DR121, DR124, M154, M383, M418, M420, P368 EPA found the assumptions that form the bases of the CCEM conclusions to be technically adequate and adequately explained and supported. The CCEMs and the document review process are sufficiently detailed to identify any potential impacts to the long-term isolation of TRU waste, if such impacts exist.

Does the waste characterization program adequately define, describe, address or satisfy the following:	Yes, No, NA	Objective Evidence and Comments
5) Waste Stream Certification		
5-1) Is the CBFO-approved waste stream profile package – including the WSPF, a characterization information summary, and a summation of aspects – complete and accurate?	Yes	LA-CIN01.001, WSPF, 6/28/10; LA-MHD01.001, WSPF, 5/30/13; LA-MHD04.001, WSPF, 4/8/09, CN1: 5/6/09; LA-MIN03-NC.001, WSPF, 5/11/06, CN1: 4/16/08, CN2: 5/24/10; LA-MHD09.001, WSPF, 8/22/11; LA-OS-00-01.001, WSPF, 5/11/06, CN1: 12/5/06, CN2: 6/15/10 All WSPFs examined included a characterization information summary and a summation of aspects. The WSPF packages are complete and reflective of the AK and characterization completed to date.
5-2) Has a characterization checklist been completed and signed by a qualified AKE and SPM for each characterization lot? This may be documented on CCP-TP-005, Att. 13, CCP Waste Stream Characterization Checklist.	Yes	LA-CIN01.001, Att. 13s, Lots 106–113, 3/31/14–7/17/14; LA-MHD01.001, Att. 13s, Lots 446–451, 4/3–23/14 LANL-CCP has not defined a characterization lot outside OSRP since 2014. The examples provided are complete. The original Att. 13 for Lot 106 was signed 3/24/14; the Att. 13 was revised because the value for Am-241 was revised.
5-3) Has a characterization information summary been adequately completed for each characterization lot?	Yes	LA-CIN01.001, CIS, Lots 106–113, 5/15/14; LA-MHD01.001, CIS, Lots 446–451, 5/15/14; LA-MHD04.001, CIS, Lots 71–79, 4/24/14; LA-MIN03.001, CIS, Lots 85–91, 5/15/14; LA-MDH09.001, CIS, Lots 25–28, 5/15/14; LA-OS-00-01.001, CIS, Lot 86, 4/20/16 LANL-CCP has not defined a characterization lot outside OSRP since 2014. The examples provided are complete. The CIS is not dependent on the Att. 13; therefore, the revision to the Lot 106 Att. 13 does not impact the Lot 106 CIS.
5-4) Has an AK accuracy report been completed for each active waste stream at least annually and is the report complete and technically adequate? This may be documented on a CCP-TP-005, Att. 14, CCP Acceptable Knowledge Accuracy Report, with an associated narrative.	Yes	LA-CIN01.001, No New Lots, 8/24/15, 7/27/16; LA-MHD01.001, No New Lots, 8/24/15, 7/27/16; LA-MHD04.001, No New Lots, 8/24/15, 7/27/16; LA-MIN03-NC.001, No New Lots, 8/24/15, 7/27/16; LA-MHD09.001, Lots 25–28, 8/24/15, No New Lots, 7/27/16 Characterization lots must be assigned before AK accuracy assessments are completed. Therefore, there has been no AK accuracy assessment for most waste streams since 2014. LANL-CCP generated annual statements to this effect.

Does the waste characterization program adequately define, describe, address or satisfy the following:	Yes, No, NA	Objective Evidence and Comments
6) System of Controls		
6-1) Are AKSRs complete and do they contain sufficient detail to delineate each included waste stream?	Yes	CCP-AK-LANL-004, Rev. 11 and Rev. 12 Draft H; CCP-AK-LANL-006, Rev. 13; CCP-AK-LANL-008, Rev. 9; CCP-AK-LANL-010, Rev. 6 and Rev. 7 Draft E Freeze files for CCP-AK-LANL-004, CCP-AK-LANL-006, CCP-AK-LANL-008 Several LANL-CCP AKSRs have drafts under review and/or freeze files in place documenting changes to be implemented during the next review cycle. These change files indicate implementation of a system of controls regarding the AKSR contents. EPA examined the change files and determined that none of the changes impact the characterization.
6-2) Is the defense determination for all WIPP-bound waste documented?	Yes	CCP-AK-LANL-004, Rev. 11; CCP-AK-LANL-006, Rev. 13; CCP-AK-LANL-008, Rev. 9; CCP-AK-LANL-010, Rev. 6
6-3) Is there documentation that none of the waste in the waste stream is HLW?	Yes	CCP-AK-LANL-004, Rev. 11; CCP-AK-LANL-006, Rev. 13; CCP-AK-LANL-008, Rev. 9; CCP-AK-LANL-010, Rev. 6
6-4) Is there documentation that none of the waste in the waste stream is SNF?	Yes	CCP-AK-LANL-004, Rev. 11; CCP-AK-LANL-006, Rev. 13; CCP-AK-LANL-008, Rev. 9; CCP-AK-LANL-010, Rev. 6
6-5) If payload management of TRU alpha activity concentration of waste containers selected for overpacking is being conducted for any LANL-CCP waste stream, does the applicable AKSR include an estimate of the total waste volume and the percentage of the waste volume that is above and below 100 nCi/g?	N/A	LANL-CCP is not overpacking any waste containers for the purposes of payload management.

Does the waste characterization program adequately define, describe, address or satisfy the following:	Yes, No, NA	Objective Evidence and Comments
6-6) Is the AK collection process adequately documented? Documentation may include CCP-TP-005 forms: Att. 1, Acceptable Knowledge Documentation Checklist; Att. 2, Record of Communication; Att. 3, Acceptable Knowledge Source Document Summary; Att. 4, Acceptable Knowledge Information List.	Yes	Att. 1 forms: LA-CIN01.001, 6/9/14; LA-MHD01.001, 8/10/15; LA-OS-00-01.001, 7/24/14; LA-MHD04.001, 6/10/14; LA-MIN03-NC.001, 6/10/14; LA-MHD09.001, 6/19/14 Att. 3 forms for all source documents cited in reference list. Att. 4 forms: LA-CIN01.001, 6/9/14; LA-MHD01.001, 5/3/16; LA-OS-00-01.001, 8/5/15; LA-MHD04.001, 6/10/14; LA-MIN03-NC.001, 6/9/14; LA-MHD09.001, 6/9/14 EPA examined the Att. 3 for each source document listed in this table and/or in the reference list to this report and found them to adequately summarize the associated source documents. The Att. 3s, where appropriate, also document the AKE's "walk down" of the procedure to verify the steps. In the future, the "walk downs" of certain procedures will be conducted under CCP-PO-045 and documented on CCP-PO-045, Attachment 2 form. EPA may example samples of this documentation during a future inspection or evaluation. EPA did not examine any documentation of verbal communication and therefore did not come across any Att. 2s. The Att. 1s and Att. 4s listed above are incomplete; they include all of the source documents cited in the current AKSRs, but do not include the additional source documents added during the enhanced AK process. This is because while doing the research for the enhanced AK, LANL-CCP decided to generate a single source document library instead of a library for each set of AK (i.e., for the AK associated with each AKSR). This required renumbering many of the source documents and until the AKSRs are revised to reflect the new source document numbers, adding the new source documents that are numbered using the new system to the Att. 1s and Att. 4s that use the old numbering system would be very confusing. EPA finds this explanation adequate and will revisit the Att. 1 and Att. 4 documentation during a future inspection or evaluation.
6-7) If applicable, are the data and information shared between related waste streams adequately documented?	Yes	CCP-AK-LANL-004, Rev. 11; CCP-AK-LANL-006, Rev. 13; CCP-AK-LANL-008, Rev. 9; CCP-AK-LANL-010, Rev. 6 Very closely related waste streams (e.g., same generating process but different SCGs) are documented in the same AKSR. Where information is shared across AKSRs, an AKSR may be referenced in other AKSRs. The collection of AK and characterization data for each container is sufficiently traceable and documented.

ATTACHMENT C: HIGH-ENERGY NEUTRON COUNTER (HENC) NO. 3 BASELINE INSPECTION CHECKLIST

EPA Inspection No: LANL-CCP-Baseline-2017 **Inspection Date: February 7–9, 2017**

Technical Element/Aspect	Yes, No, NA	Comments and Objective Evidence
1) General System Attributes		
1-1) Is the LANL HENC 3 in the same location as when EPA initially inspected and approved it?	Yes	The NDA system is the HENC 3 located at TA-55 on the HENC 3 Pad, as described in EPA report No. A-98-49; II-A4-199, EPA Air e-Docket No: EPA-HQ-OAR-2001-0012-0456; revised October 7, 2015. The EPA inspector confirmed the identify and location of the HENC 3.
1-2) Do LANL-CCP documents adequately describe the HENC 3?	Yes	Calibration Report for the HENC 3 at the Los Alamos Laboratory TA-55 Facility, LANL-HENC3-NDA-101, Revision 2; June 16, 2015. System is described in in detail in previous EPA report No. A-98-49; II-A4-199, EPA Air e-Docket No: EPA-HQ-OAR-2001-0012-0456; revised October 7, 2015.
2) System Performance		
2-1) Are the container types, types of TRU waste, and the operational parameters for the HENC 3 defined and reasonable?	Yes	The container and wastes types, and operational parameters are documented in Calibration Report for the HENC 3 at the Los Alamos Laboratory TA-55 Facility, LANL-HENC3-NDA-101, Revision 2; June 16, 2015.The HENC 3 is capable of assaying CH TRU wastes (debris, soils/gravel, and homogeneous solids) in two measurement geometries: 55-gallon drums; and 12" POCs. **The HENC 3 is not approved to assay Criticality Container Overpacks (COCs)**.
2-2) Did LANL-CCP provide documentation regarding how many waste containers and approved BDRs were assayed by the HENC 3 since its initial approval?	Yes	Since initial EPA approval, LANL-CCP has produced HENC 3 BDRs 5LANDA0018 through 5LANDA0044, 5LANDA0045 & 5LANDA0046 (PDP), and 5LANDA0047 through 5LANDA0053.
2-3) Is the HENC 3 able to report quantitative values and uncertainties for the WIPP-tracked radionuclides?	Yes	Direct Measurements: ^{238}Pu, ^{239}Pu, ^{241}Am, ^{233}U, ^{235}U, ^{238}U, ^{137}Cs and ^{237}Np. Nuclides by Scaling: ^{90}Sr, ^{234}U and ^{242}Pu. Pu and other TRU isotopic ratios are determined using MGA or FRAM software, or approved AK, with a combination of neutron and gamma measurements. This was confirmed with NDA personnel during inspection. FRAM/MGA do not work with ^{242}Pu in POCs; these isotopics are AK only.

Technical Element/Aspect	Yes, No, NA	Comments and Objective Evidence
2-4) Have background measurements been taken each operational day? Have any instances of problematic background radiation been documented?	Yes	Evidence of daily background measurements was seen in the logbook pages reviewed from HENC 3 Operational Logbook-002. Authorized personnel: Israel Aragon, Scott Sterale, Joe Wachter, Wyly Cameron, and Matt Bush EPA reviewed the logbook entries from the HENC 3 operational logbook and all entries showed that background measurements were made and acceptable. LANL-CCP Memorandum dated 1-8-2015 re: elevated background rates due to sources in safes near HENC 3; new background limits established. Memorandum: HENC 3 Neutron Totals Background Limit Change, J. Wachter, January 6, 2015. This was discussed with NDA personnel during the evaluation. CCP-CH-LANL-NDA-HENC-3-01, HENC3 LANL TA-55 2017.
2-5) Have system performance checks been completed at least once per operational day? Are the procedures for the performance checks technically adequate for the HENC 3, including gamma matrix correction checks, and gamma peak position and resolution checks?	Yes	Performance measurements are required in CCP-TP-107, Revision 18. EPA reviewed entries from the HENC 3 operational logbook and all entries showed that performance checks were made and were acceptable. CCP-CH-LANL-NDA-HENC-3-01, HENC3 LANL TA-55 2017.
3) System Calibration & Calibration Verifications		
3-1) Does the HENC 3 have a calibration of record? Were consensus standards used in the initial calibration? If so, which standards?	Yes	Calibration Report for the HENC 3 at the Los Alamos Laboratory TA-55 Facility, LANL-HENC3-NDA-101, Revision 2; June 16, 2015 ISOCS gamma calibration was performed in Meriden, CT, and confirmed at LANL; neutron calibration performed and confirmed at LANL. LANL-CCP used consensus standards ASTM C-1030, C-1133, C-1207 and C-1500 for the HENC 3 calibration.
3-2) Are the calibration, execution of performance checks and operation of the HENC 3, the calculation of radionuclide values and the review/validation of HENC 3 data governed by controlled-copy (formal) procedures?	Yes	CCP-TP-107, Operating Procedure, Revision 18 CCP-TP-108, Calibration Procedure, Revision 19 CCP-TP-103, Data Review Procedure, Revision 13 These were confirmed with LANL-CCP NDA personnel. Copies of the current operating and calibration procedures were available to NDA operators in the HENC 3 control room.
3-3) Are the isotopic contributions of unmeasured radionuclides derived using a certain method?	Yes	^{241}Am and Pu isotopics determined by MGA or FRAM software when enough mass exists; site-approved AK is used. Gamma software: NDA 2000, Version 4.0; Genie 2000 Version 3.0 This was confirmed with LANL-CCP NDA personnel during evaluation and by direct observation of HENC 3 at TA-55.

Technical Element/Aspect	Yes, No, NA	Comments and Objective Evidence
3-4) Were traceable radionuclide sources used for calibration confirmation and/or verifications? If so, list or reference all standards used.	Yes	EPA reviewed all source certificates found in LANL-HENC3-NDA-101, Calibration Report for the HENC 3 at the Los Alamos Laboratory TA 55 Facility, Revision 2, June 16, 2015, Attachment 1. All standards are traceable to the national standards base and are acceptable to use for the HENC 3 calibration. All WG Pu standards and 0.4 g HS Pu standard are acceptable. Due to lack of ^{242}Pu standards, the neutron yields are based on modifications of the ^{240}Pu, as follows: ^{242}Pu neutron yield = $^{240}Pu_{Eff}$ x 1.69 ^{238}Pu neutron yield = $^{240}Pu_{Eff}$ x 0.67 Note on ^{242}Pu Isotopics: ^{242}Pu will almost always fail MGA & FRAM, but it may indicate ~50% ^{239}Pu which tells EA to look for ^{242}Pu; EA relies heavily on AK isotopics, especially for ^{242}Pu in wastes from AK Nos. 4, 6 & 9.
3-5) Have the operational ranges with respect to matrix (density) and activity been determined for the HENC 3?	Yes	LANL-HENC3-NDA-101, Calibration Report for the HENC 3 at the Los Alamos Laboratory TA 55 Facility, Revision 2, June 16, 2015 Acceptable density range for gamma is 0.01–2.50 g/cc; activity is limited by spectral parameters (peak shape and resolution) and system dead time; no stated neutron limitations, however, limits with respect to neutron-specific properties are an integral part of the software.
3-6) Has a calibration verification been completed for the HENC 3? If so, what is the date of the last calibration verification? Have any others been completed in the last year?	Yes	Four calibration verifications have been performed since EPA's initial approval in 2015. A minimal number of routine samples have been assayed, system was out-of-service from 10-31-2016 to 1-4-2017; was brought back in service following successful calibration verification on 1-10-17, documented on pages 4 & 5 on HENC 3 Operational Logbook.
3-7) Does the HENC 3 meet the requirements for accuracy and precision as specified in DOE/WIPP-02-3122, Appendix A, Table A-2 for calibration verifications?	Yes	LANL-HENC3-NDA-101, Calibration Report for the HENC 3 at the Los Alamos Laboratory TA 55 Facility, Revision 2, June 16, 2015. All criteria for accuracy and precision were met for gamma and passive neutron calibration verification and confirmation.
3-8) Have any NCRs related to the HENC 3 been issued since the EPA'S initial approval?	Yes	NCR numbers NCR-LANL-0101, 0105, 0106, 0106, 0108, 0109, 0110, 0131 & 012
3-9) Do the BDRs contain: • Testing facility name, testing batch number, container numbers, and signature of the SPM or designee • Table of contents • Background and performance check data or control charts for the relevant time period • Separate testing report sheets for each container	Yes	HENC 3 BDRs 5LANDA0018 through 5LANDA0044, 5LANDA0045 & 5LANDA0046 (PDP), and 5LANDA0047 through 5LANDA0053 5LANDA0003. EPA reviewed three HENC 3 BDRs and they contained all required information: 5LANDA0029 (6 containers); 5LANDA0050 (5 containers); and 5LANDA0035 (5 containers).

Technical Element/Aspect	Yes, No, NA	Comments and Objective Evidence
3-10) Do the RDSs include: • Title "Radioassay Data Sheet" • Method/procedure used • Date of radioassay • Activities and associated TMU for individual radionuclides • TRU alpha concentration and its associated TMU • Operator and reviewer signatures	Yes	HENC 3 BDRs 5LANDA0018 through 5LANDA0044, 5LANDA0045 & 5LANDA0046 (PDP), and 5LANDA0047 through 5LANDA0053 5LANDA0003. EPA reviewed three HENC 3 BDRs and they contained all required information: 5LANDA0029 (6 containers); 5LANDA0050 (5 containers); and 5LANDA0035 (5 containers)
4) Total Measurement Uncertainty		
4-1) Is the magnitude of the TMU values observed in the HENC 3 BDRs examined during the inspection within the expected range?	Yes	The TMU for the HENC 3 is documented in "Total Measurement Uncertainty for the HENC#3 with Integrated Gamma Spectrometer, April 24, 2014. EPA evaluated three HENC 3 BDRs provided: 5LANDA0029, 5LANDA0050 and 5LANDA0035. TMU values were within the expected range in all instances. TMU consists of contributions of uncertainty from: calibration sources; ISOCS modeling; detector positioning, matrix in homogeneity, non-uniform source distribution, fill-height uncertainty; self-attenuation of SNM "lumps"; counting statistics; background fluctuations; radionuclide interferences; and isotopic measurement. The ISOCS Uncertainty estimator is used to calculate TMU.
5) Lower Limit of Detection		
5-1) Has the LLD for the HENC 3 has been determined? Is the LLD determination appropriate for the types of TRU waste LANL-CCP expects to assay on the HENC 3? Is the technical basis for the LLD determination documented?	Yes	LANL reports MDCs (MDA ÷ item net weight). Typical MDCs are derived by performing three replicate assays on each container type and detector position with matrix containers without radioactive sources. The MDCs documented in Section 7 of LANL-HENC3-NDA-101, Revision 1, indicate that the instrument meets the TRU discrimination criterion of 100 nCi/g; however, note specific limitations in following checklist entry. MDAs are variable and depend on measurement conditions such as background and matrix. LANL-CCP provided example gamma and neutron MDCs for sludge, combustibles, glass, metals and cement.
5-2) Is the HENC 3 used to discriminate TRU/Non-TRU wastes at the 100 nCi/g criterion? If so, does the HENC 3 have the required sensitivity?	Yes	LANL-HENC3-NDA-101, Calibration Report for the HENC 3 at the Los Alamos Laboratory TA 55 Facility, Revision 2, June 16, 2015. **Limitations: HENC 3 assays for POCs near 100 nCi/g are not acceptable. HENC 3 assays for debris, sludge and cement near 100 nCi/g should be gamma only; neutron values for debris must be greater than 100 nCi/g; neutron values for sludge and cement are marginal. ^{242}Pu values must be passive neutron, gamma ^{242}Pu values are not allowed; all gamma and neutron HENC 3 assays are subject to evaluation by the EA.**

Technical Element/Aspect	Yes, No, NA	Comments and Objective Evidence
5-3) Are there any instances where an LLD value for a non-measured radionuclide is not provided based on a lack of technical feasibility?	Yes	LANL-HENC3-NDA-101, Calibration Report for the HENC 3 at the Los Alamos Laboratory TA 55 Facility, Revision 2, June 16, 2015. Because an LLD is a measurement-based parameter, it is not technically feasible to calculate for radionuclides that are not directly measured. ^{242}Pu is derived from the measured mass of ^{239}Pu times an appropriate scaling factor computed from measured or declared mass fractions. LANL-CCP states the ^{234}U scaling factor 0.014 is used for wastes containing ^{235}U, and the scaling factor 0.427 is used for wastes containing primarily ^{238}Pu. Since MDAs for ^{235}U and ^{238}Pu vary according to measurement conditions, the reporting thresholds for ^{234}U will also vary. ^{90}Sr activity is assumed equal to ^{137}Cs activity in wastes containing fission products. Typical gamma reporting thresholds are shown in LANL-HENC3-NDA-101, Table 9 and Section 7.2.
6) PDP Participation		
6-1) Has the HENC 3 participated successfully in the CBFO NDA PDP? If so, identify the last cycle.	Yes	Performance Demonstration Program for Nondestructive Assay of Drummed Waste Scoring Report-Supplemental Cycle 21B, January 2015 Distribution. LANL submitted HENC 3 results for Cycle 21B on 2-9-2015 for metals, glass, combustibles and sludge. The HENC 3 passed all criteria.
7) Training		
7-1) Do all operators have current CCP training as verified on an LOQI?	Yes	A February 8, 2017, LOQI was provided to EPA reviewers. The LOQI listed: two operator-Independent Technical Reviewers (ITRs) Tim Barton & Scott Sterkel; three EAs, Sheri Chambers, Bart Morales & Joseph Wachter. EPA confirmed the qualifications of all five HENC 3 personnel.
7-2) Are HENC 3 data reviewed and approved by qualified personnel? If so, identify the name of the individuals performing technical review and approval of HENC 3 BDRs.	Yes	Data review in the HENC 3 BDRs reviewed by EPA (5LANDA0029, 5LANDA0050 and 5LANDA0035 was performed by Tim Barton and Scott Sterkel, (Operator/ITR), and Joe Wachter, Bart Morales and Sheri Chambers (EA).
8) Replicate Testing		
8-1) Has replicate testing of the HENC 3 been performed, and does it meet the EPA Replicate Testing Protocol?	Yes	The HENC 3 reassayed CH TRU Container Nos. 67820, 67772 and 67243, all results were acceptable.

ATTACHMENT D.1: REPLICATE TESTING DATA FOR DRUM NO. 67243

Quantity of Interest	Original Measurement			Replicate #1			Replicate #2		
	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty
^{233}U Activity (Ci)		N/A			N/A			N/A	
^{234}U Activity (Ci)		N/A			N/A			N/A	
^{238}U Activity (Ci)		N/A			N/A			N/A	
^{238}Pu Activity (Ci)	7.57E-04	1.20E-04	1.59E-01	7.50E-04	1.24E-04	1.65E-01	7.71E-04	1.24E-04	1.60E-01
^{239}Pu Activity (Ci)	2.87E-02	4.54E-03	1.58E-01	2.74E-02	4.51E-03	1.65E-01	2.95E-02	4.75E-03	1.61E-01
^{240}Pu Activity (Ci)	6.72E-03	1.06E-03	1.58E-01	6.41E-03	1.06E-03	1.65E-01	6.89E-03	1.11E-03	1.61E-01
^{242}Pu Activity (Ci)	3.90E-07	6.17E-08	1.58E-01	3.72E-07	6.13E-08	1.65E-01	4.01E-07	6.46E-08	1.61E-01
^{241}Am Activity (Ci)	7.74E-03	1.22E-03	1.58E-01	7.58E-03	1.25E-03	1.65E-01	7.76E-03	1.25E-03	1.61E-01
^{90}Sr Activity (Ci)		N/A			N/A			N/A	
^{137}Cs Activity (Ci)		N/A			N/A			N/A	
TRU Alpha Conc. (nCi/g)	4.07E+03	4.46E+02	1.10E-01	3.90E+03	4.45E+02	1.14E-01	4.16E+03	4.67E+02	1.12E-01
^{232}U Activity (Ci)		N/A			N/A			N/A	
^{237}Np Activity (Ci)	7.18E-07	1.14E-07	1.59E-01	7.82E-07	1.90E-07	2.43E-01	7.15E-07	1.05E-07	1.47E-01
^{235}U Activity (Ci)		N/A			N/A			N/A	

Quantity of Interest	Replicate #3			Replicate #4			Replicate #5		
	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty
^{233}U Activity (Ci)		N/A			N/A			N/A	
^{234}U Activity (Ci)		N/A			N/A			N/A	
^{238}U Activity (Ci)		N/A			N/A			N/A	
^{238}Pu Activity (Ci)	8.09E-04	1.29E-04	1.59E-01	8.43E-04	1.30E-04	1.54E-01	8.44E-04	1.31E-04	1.55E-01
^{239}Pu Activity (Ci)	3.09E-02	4.94E-03	1.60E-01	3.25E-02	5.02E-03	1.54E-01	3.23E-02	5.00E-03	1.55E-01
^{240}Pu Activity (Ci)	7.23E-03	1.16E-03	1.60E-01	7.60E-03	1.17E-03	1.54E-01	7.55E-03	1.17E-03	1.55E-01
^{242}Pu Activity (Ci)	4.20E-07	6.71E-08	1.60E-01	4.41E-07	6.83E-08	1.55E-01	4.38E-07	6.80E-08	1.55E-01
^{241}Am Activity (Ci)	7.76E-03	1.24E-03	1.60E-01	7.75E-03	1.20E-03	1.55E-01	7.74E-03	1.20E-03	1.55E-01
^{90}Sr Activity (Ci)		N/A			N/A			N/A	
^{137}Cs Activity (Ci)		N/A			N/A			N/A	
TRU Alpha Conc. (nCi/g)	4.33E+03	4.84E+02	1.12E-01	4.51E+03	4.90E+02	1.09E-01	4.48E+03	4.89E+02	1.09E-01
^{232}U Activity (Ci)			N/A			N/A			
^{237}Np Activity (Ci)	1.42E-01	7.22E-07	1.37E-07	1.90E-01	7.32E-07	1.23E-07	1.68E-01	1.42E-01	7.22E-07
^{235}U Activity (Ci)			N/A			N/A			

ATTACHMENT D.1: REPLICATE TESTING DATA FOR DRUM NO. 67243

Quantity of Interest	Original Measurement		Sample Mean	Sample Standard Deviation	Relative Standard Deviation	χ^2	Pr($x < \|\chi^2\|$)	t	Pr($x < \|t\|$)
	Reported Value	Absolute Uncertainty							
^{233}U Activity (Ci)	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
^{234}U Activity (Ci)	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
^{238}U Activity (Ci)	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
^{238}Pu Activity (Ci)	7.57E-04	1.20E-04	8.03E-04	4.23E-05	5.26E-02	4.96E-01	9.74E-01	-1.00E+00	3.73E-01
^{239}Pu Activity (Ci)	2.87E-02	4.54E-03	3.05E-02	2.12E-03	6.95E-02	8.74E-01	9.28E-01	-7.83E-01	4.77E-01
^{240}Pu Activity (Ci)	6.72E-03	1.06E-03	7.14E-03	4.96E-04	6.95E-02	8.75E-01	9.28E-01	-7.66E-01	4.86E-01
^{242}Pu Activity (Ci)	3.90E-07	6.17E-08	4.14E-07	2.86E-08	6.90E-02	8.60E-01	9.30E-01	-7.79E-01	4.80E-01
^{241}Am Activity (Ci)	7.74E-03	1.22E-03	7.72E-03	7.76E-05	1.01E-02	1.62E-02	1.00E+00	2.59E-01	8.09E-01
^{90}Sr Activity (Ci)	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
^{137}Cs Activity (Ci)	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TRU Alpha Conc. (nCi/g)	4.07E+03	4.46E+02	4.28E+03	2.52E+02	5.89E-02	1.28E+00	8.65E-01	-7.46E-01	4.97E-01
^{232}U Activity (Ci)	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
^{237}Np Activity (Ci)	7.18E-07	1.14E-07	7.38E-07	2.63E-08	3.56E-02	2.12E-01	9.95E-01	-7.02E-01	5.21E-01
^{235}U Activity (Ci)	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Quantity of Interest	χ^2 Test	t Test
^{233}U Activity (Ci)	Not Applicable	Not Applicable
^{234}U Activity (Ci)	Not Applicable	Not Applicable
^{238}U Activity (Ci)	Not Applicable	Not Applicable
^{238}Pu Activity (Ci)	Not Significant	Not Significant
^{239}Pu Activity (Ci)	Not Significant	Not Significant
^{240}Pu Activity (Ci)	Not Significant	Not Significant
^{242}Pu Activity (Ci)	Not Significant	Not Significant
^{241}Am Activity (Ci)	Not Significant	Not Significant
^{90}Sr Activity (Ci)	Not Applicable	Not Applicable
^{137}Cs Activity (Ci)	Not Applicable	Not Applicable
TRU Alpha Conc. (nCi/g)	Not Significant	Not Significant
^{232}U Activity (Ci)	Not Applicable	Not Applicable
^{237}Np Activity (Ci)	Not Significant	Not Significant
^{235}U Activity (Ci)	Not Applicable	Not Applicable

ATTACHMENT D.2: REPLICATE TESTING DATA FOR DRUM NO. 67772

Quantity of Interest	Original Measurement			Replicate #1			Replicate #2		
	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty
^{233}U Activity (Ci)		N/A			N/A			N/A	
^{234}U Activity (Ci)		N/A			N/A			N/A	
^{238}U Activity (Ci)		N/A			N/A			N/A	
^{238}Pu Activity (Ci)	1.58E-01	3.97E-02	2.51E-01	1.57E-01	3.93E-02	2.50E-01	1.58E-01	3.95E-02	2.50E-01
^{239}Pu Activity (Ci)	6.03E+00	1.25E+00	2.07E-01	5.99E+00	1.24E+00	2.07E-01	6.03E+00	1.25E+00	2.07E-01
^{240}Pu Activity (Ci)	1.41E+00	3.54E-01	2.51E-01	1.40E+00	3.52E-01	2.51E-01	1.41E+00	3.53E-01	2.50E-01
^{242}Pu Activity (Ci)	8.20E-05	2.05E-05	2.50E-01	8.14E-05	2.04E-05	2.51E-01	8.19E-05	2.05E-05	2.50E-01
^{241}Am Activity (Ci)	7.02E-01	4.69E-01	6.68E-01	7.02E-01	1.20E-01	1.71E-01	7.16E-01	1.23E-01	1.72E-01
^{90}Sr Activity (Ci)		N/A			N/A			N/A	
^{137}Cs Activity (Ci)		N/A			N/A			N/A	
TRU Alpha Conc. (nCi/g)	6.54E+05	1.09E+05	1.67E-01	6.49E+05	1.02E+05	1.57E-01	6.54E+05	1.02E+05	1.56E-01
^{232}U Activity (Ci)		N/A			N/A			N/A	
^{237}Np Activity (Ci)	1.20E-05	1.35E-06	1.13E-01	1.23E-05	9.88E-07	8.03E-02	1.23E-05	1.20E-06	9.76E-02
^{235}U Activity (Ci)		N/A			N/A			N/A	

Quantity of Interest	Replicate #3			Replicate #4			Replicate #5		
	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty
^{233}U Activity (Ci)		N/A			N/A			N/A	
^{234}U Activity (Ci)		N/A			N/A			N/A	
^{238}U Activity (Ci)		N/A			N/A			N/A	
^{238}Pu Activity (Ci)	1.59E-01	4.03E-02	2.53E-01	1.58E-01	3.85E-02	2.44E-01	1.58E-01	3.95E-02	2.50E-01
^{239}Pu Activity (Ci)	6.07E+00	1.28E+00	2.11E-01	6.02E+00	1.20E+00	1.99E-01	6.02E+00	1.25E+00	2.08E-01
^{240}Pu Activity (Ci)	1.42E+00	3.60E-01	2.54E-01	1.41E+00	3.44E-01	2.44E-01	1.41E+00	3.53E-01	2.50E-01
^{242}Pu Activity (Ci)	8.25E-05	2.09E-05	2.53E-01	8.19E-05	2.00E-05	2.44E-01	8.18E-05	2.05E-05	2.51E-01
^{241}Am Activity (Ci)	6.99E-01	1.22E-01	1.75E-01	7.07E-01	1.23E-01	1.74E-01	7.05E-01	1.22E-01	1.73E-01
^{90}Sr Activity (Ci)		N/A			N/A			N/A	
^{137}Cs Activity (Ci)		N/A			N/A			N/A	
TRU Alpha Conc. (nCi/g)	6.57E+05	1.05E+05	1.60E-01	6.53E+05	9.88E+04	1.51E-01	6.53E+05	1.03E+05	1.58E-01
^{232}U Activity (Ci)		N/A			N/A			N/A	
^{237}Np Activity (Ci)	1.29E-05	1.31E-06	1.02E-01	1.22E-05	1.46E-06	1.20E-01	1.29E-05	1.03E-06	7.98E-02
^{235}U Activity (Ci)		N/A			N/A			N/A	

ATTACHMENT D.2: REPLICATE TESTING DATA FOR DRUM NO. 67772

Quantity of Interest	Original Measurement		Sample Mean	Sample Standard Deviation	Relative Standard Deviation	χ^2	Pr($x < \|\chi^2\|$)	t	Pr($x < \|t\|$)
	Reported Value	Absolute Uncertainty							
^{233}U Activity (Ci)	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
^{234}U Activity (Ci)	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
^{238}U Activity (Ci)	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
^{238}Pu Activity (Ci)	1.58E-01	3.97E-02	1.58E-01	7.07E-04	4.48E-03	1.27E-03	1.00E+00	0.00E+00	1.00E+00
^{239}Pu Activity (Ci)	6.03E+00	1.25E+00	6.03E+00	2.88E-02	4.78E-03	2.12E-03	1.00E+00	1.27E-01	9.05E-01
^{240}Pu Activity (Ci)	1.41E+00	3.54E-01	1.41E+00	7.07E-03	5.01E-03	1.60E-03	1.00E+00	0.00E+00	1.00E+00
^{242}Pu Activity (Ci)	8.20E-05	2.05E-05	8.19E-05	3.94E-07	4.81E-03	1.48E-03	1.00E+00	2.32E-01	8.28E-01
^{241}Am Activity (Ci)	7.02E-01	4.69E-01	7.06E-01	6.46E-03	9.15E-03	7.59E-04	1.00E+00	-5.37E-01	6.20E-01
^{90}Sr Activity (Ci)	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
^{137}Cs Activity (Ci)	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TRU Alpha Conc. (nCi/g)	6.54E+05	1.09E+05	6.53E+05	2.86E+03	4.38E-03	2.76E-03	1.00E+00	2.55E-01	8.11E-01
^{232}U Activity (Ci)	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
^{237}Np Activity (Ci)	1.20E-05	1.35E-06	1.25E-05	3.49E-07	2.79E-02	2.68E-01	9.92E-01	-1.36E+00	2.46E-01
^{235}U Activity (Ci)	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Quantity of Interest	χ^2 Test	t Test
^{233}U Activity (Ci)	Not Applicable	Not Applicable
^{234}U Activity (Ci)	Not Applicable	Not Applicable
^{238}U Activity (Ci)	Not Applicable	Not Applicable
^{238}Pu Activity (Ci)	Not Significant	Not Significant
^{239}Pu Activity (Ci)	Not Significant	Not Significant
^{240}Pu Activity (Ci)	Not Significant	Not Significant
^{242}Pu Activity (Ci)	Not Significant	Not Significant
^{241}Am Activity (Ci)	Not Significant	Not Significant
^{90}Sr Activity (Ci)	Not Applicable	Not Applicable
^{137}Cs Activity (Ci)	Not Applicable	Not Applicable
TRU Alpha Conc. (nCi/g)	Not Significant	Not Significant
^{232}U Activity (Ci)	Not Applicable	Not Applicable
^{237}Np Activity (Ci)	Not Significant	Not Significant
^{235}U Activity (Ci)	Not Applicable	Not Applicable

ATTACHMENT D.3: REPLICATE TESTING DATA FOR DRUM NO. 67820

Quantity of Interest	Original Measurement			Replicate #1			Replicate #2		
	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty
^{233}U Activity (Ci)		N/A			N/A			N/A	
^{234}U Activity (Ci)	8.45E-04	1.00E-04	1.18E-01	8.51E-04	9.29E-05	1.09E-01	8.43E-04	1.04E-04	1.23E-01
^{238}U Activity (Ci)		N/A			N/A			N/A	
^{238}Pu Activity (Ci)	5.41E+00	6.42E-01	1.19E-01	5.45E+00	5.96E-01	1.09E-01	5.40E+00	6.65E-01	1.23E-01
^{239}Pu Activity (Ci)	4.95E-03	9.14E-04	1.85E-01	5.02E-03	8.98E-04	1.79E-01	4.98E-03	9.33E-04	1.87E-01
^{240}Pu Activity (Ci)	2.46E-03	4.54E-04	1.85E-01	2.50E-03	4.46E-04	1.78E-01	2.47E-03	4.64E-04	1.88E-01
^{242}Pu Activity (Ci)	2.49E-06	4.64E-07	1.86E-01	2.52E-06	4.56E-07	1.81E-01	2.50E-06	4.73E-07	1.89E-01
^{241}Am Activity (Ci)	6.47E-03	1.18E-03	1.82E-01	6.57E-03	1.16E-03	1.77E-01	6.51E-03	1.20E-03	1.84E-01
^{90}Sr Activity (Ci)		N/A			N/A	9.45E-02		N/A	
^{137}Cs Activity (Ci)		N/A			N/A	9.45E-02		N/A	
TRU Alpha Conc. (nCi/g)	8.90E+05	1.05E+05	1.18E-01	8.96E+05	9.77E+04	1.09E-01	8.88E+05	1.09E+05	1.23E-01
^{232}U Activity (Ci)		N/A			N/A			N/A	
^{237}Np Activity (Ci)		N/A			N/A			N/A	
^{235}U Activity (Ci)		N/A			N/A			N/A	

Quantity of Interest	Replicate #3			Replicate #4			Replicate #5		
	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty	Reported Value	Absolute Uncertainty	Relative Uncertainty
^{233}U Activity (Ci)		N/A			N/A			N/A	
^{234}U Activity (Ci)	8.54E-04	1.03E-04	1.21E-01	8.36E-04	9.88E-05	1.18E-01	8.55E-04	1.04E-04	1.22E-01
^{238}U Activity (Ci)		N/A			N/A			N/A	
^{238}Pu Activity (Ci)	5.47E+00	6.63E-01	1.21E-01	5.36E+00	6.33E-01	1.18E-01	5.48E+00	6.65E-01	1.21E-01
^{239}Pu Activity (Ci)	5.04E-03	9.39E-04	1.86E-01	4.94E-03	9.10E-04	1.84E-01	5.05E-03	9.41E-04	1.86E-01
^{240}Pu Activity (Ci)	2.51E-03	4.67E-04	1.86E-01	2.46E-03	4.52E-04	1.84E-01	2.51E-03	4.68E-04	1.86E-01
^{242}Pu Activity (Ci)	2.53E-06	4.76E-07	1.88E-01	2.48E-06	4.62E-07	1.86E-01	2.54E-06	4.77E-07	1.88E-01
^{241}Am Activity (Ci)	6.60E-03	1.21E-03	1.83E-01	6.46E-03	1.17E-03	1.81E-01	6.61E-03	1.21E-03	1.83E-01
^{90}Sr Activity (Ci)		N/A			N/A			N/A	
^{137}Cs Activity (Ci)		N/A			N/A			N/A	
TRU Alpha Conc. (nCi/g)	9.00E+05	1.09E+05	1.21E-01	8.81E+05	1.04E+05	1.18E-01	9.01E+05	1.09E+05	1.21E-01
^{232}U Activity (Ci)	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
^{237}Np Activity (Ci)	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
^{235}U Activity (Ci)	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

ATTACHMENT D.3: REPLICATE TESTING DATA FOR DRUM NO. 67820

Quantity of Interest	Original Measurement		Sample Mean	Sample Standard Deviation	Relative Standard Deviation	χ^2	Pr($x < \|\chi^2\|$)	t	Pr($x < \|t\|$)
	Reported Value	Absolute Uncertainty							
^{233}U Activity (Ci)	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
^{234}U Activity (Ci)	8.45E-04	1.00E-04	8.48E-04	8.11E-06	9.56E-03	2.63E-02	1.00E+00	-3.15E-01	7.68E-01
^{238}U Activity (Ci)	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
^{238}Pu Activity (Ci)	5.41E+00	6.42E-01	5.43E+00	5.07E-02	9.33E-03	2.49E-02	1.00E+00	-3.96E-01	7.12E-01
^{239}Pu Activity (Ci)	4.95E-03	9.14E-04	5.01E-03	4.56E-05	9.11E-03	9.96E-03	1.00E+00	-1.12E+00	3.25E-01
^{240}Pu Activity (Ci)	2.46E-03	4.54E-04	2.49E-03	2.35E-05	9.42E-03	1.07E-02	1.00E+00	-1.17E+00	3.08E-01
^{242}Pu Activity (Ci)	2.49E-06	4.64E-07	2.51E-06	2.41E-08	9.58E-03	1.08E-02	1.00E+00	-9.10E-01	4.14E-01
^{241}Am Activity (Ci)	6.47E-03	1.18E-03	6.55E-03	6.36E-05	9.72E-03	1.16E-02	1.00E+00	-1.15E+00	3.15E-01
^{90}Sr Activity (Ci)	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
^{137}Cs Activity (Ci)	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TRU Alpha Conc. (nCi/g)	8.90E+05	1.05E+05	8.93E+05	8.53E+03	9.55E-03	2.64E-02	1.00E+00	-3.43E-01	7.49E-01
^{232}U Activity (Ci)	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
^{237}Np Activity (Ci)	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
^{235}U Activity (Ci)	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Quantity of Interest	χ^2 Test	t Test
^{233}U Activity (Ci)	Not Applicable	Not Applicable
^{234}U Activity (Ci)	Not Significant	Not Significant
^{238}U Activity (Ci)	Not Applicable	Not Applicable
^{238}Pu Activity (Ci)	Not Significant	Not Significant
^{239}Pu Activity (Ci)	Not Significant	Not Significant
^{240}Pu Activity (Ci)	Not Significant	Not Significant
^{242}Pu Activity (Ci)	Not Significant	Not Significant
^{241}Am Activity (Ci)	Not Significant	Not Significant
^{90}Sr Activity (Ci)	Not Applicable	Not Applicable
^{137}Cs Activity (Ci)	Not Applicable	Not Applicable
TRU Alpha Conc. (nCi/g)	Not Significant	Not Significant
^{232}U Activity (Ci)	Not Applicable	Not Applicable
^{237}Np Activity (Ci)	Not Applicable	Not Applicable
^{235}U Activity (Ci)	Not Applicable	Not Applicable

ATTACHMENT E: VISUAL EXAMINATION BASELINE INSPECTION CHECKLIST

Technical Element or Aspect	Yes, No or NA	Comments and Objective Evidence
1) Visual Examination Process		
1-1) Do LANL-CCP procedures and technical guidance documents provide complete instructions for performing CH VE?	Yes	LANL-CCP VE personnel have specific procedures and/or technical guidance in Container Management, Non-Conformance Reporting, Conduct of Operations, AK Documents and TRUCON Codes CCP-TP-113, CCP Standard Contact-Handled Waste Visual Examination; CCP-TP-069, Sealed Source Visual Examination and Packaging
1-2) Are corrective actions taken and appropriately documented and closed when necessary?	Yes	Reporting of Non Conformances is addressed directly in LANL-CCP procedures and training; EPA did not observe any ALNL NCRs during this baseline inspection
2) Visual Examination Records		
2-1) Are all appropriate VE records available for review?	Yes	All training records, LOQI, List of Prohibited Items, AK Summaries and other records were readily available for review
2-2) Are BDR reviews at the data generation and project levels completed and adequately documented?	Yes	VE BDR LAVE030063, February 15, 2017
3) Personnel Training		
3-1) Are the VE personnel adequately trained and qualified?	Yes	LANL-CCP records indicate that CH TRU VE personnel were appropriately trained VE Qualification Packages VE-01, Revision 6 and VE-OSRP-01, Revision 8 for LANL-CCP CH TRU VE personnel
3-2) Are the VE personnel qualification and re-qualification requirements adequately described?	Yes	VE Qualification Package VE-01, Revision 6 and VE-OSRP-01, Revision 8, adequately present requirements
3-3) Does LANL-CCP have a designated VEE for CH VE?	Yes	LANL-CCP had designated VEES, as documented by VEE appointment letters

ATTACHMENT F: LIST OF DOCUMENTS REVIEWED FOR THIS INSPECTION

Acceptable Knowledge

Acceptable Knowledge Accuracy Report, Waste Stream LA MHD04.001, No New Lots, August 20, 2015; No New Lots, Cumulative for Lots 1–79, July 27, 2016

Acceptable Knowledge Accuracy Report, Waste Stream LA MIN03-NC.001, No New Lots, August 24, 2015; No New Lots, Cumulative for Lots 1–91, July 27, 2016

Acceptable Knowledge Accuracy Report, Waste Stream LA-CIN01.001, No New Lots, August 24, 2015; No New Lots, Cumulative for Lots 1–113, July 27, 2016

Acceptable Knowledge Accuracy Report, Waste Stream LA-MHD01.001, No New Lots, August 24, 2015; No New Lots, Cumulative for Lots 1–451, July 27, 2016

Acceptable Knowledge Accuracy Report, Waste Stream LA-MHD09.001, Lots 25–28, August 24, 2015, No New Lots, Cumulative for Lots 1–28, July 27, 2016

AK Tracking Spreadsheet, January 31, 2017

AKA01, Acceptable Knowledge Assessment of Containers from Acceptable Knowledge Summary Report CCP-AK-LANL-006, Waste Stream LA-MHD01.001, M. Papp, AKA01, January 5, 2017

AKA02, Acceptable Knowledge Assessment of Containers from Acceptable Knowledge Summary Report CCP-AK-LANL-006, Waste Stream LA-CIN01.001, M. Papp, AKA02, January 5, 2017

AKA03, Acceptable Knowledge Assessment of Containers from Acceptable Knowledge Summary Report CCP-AK-LANL-006, Waste Stream LA-MIN04-S.001, M. Papp, AKA03, January 5, 2017

AKA04, Acceptable Knowledge Assessment of Containers from Acceptable Knowledge Summary Report CCP-AK-LANL-010, Waste Stream LA-MHD04.001, M. Papp, AKA04, February 28, 2017

AKE Qualification Cards for J. Kleckner (10/25/2016), S. Nance (10/26/2016), M. Papp (10/26/2016), L. Watson (2/6/2017), S. Schafer (10/25/2016), J. Schoen (10/27/2016), C. Walker (10/26/2016)

Assigned Reading for all AKEs and SPMs: CCP-TP-005, Revision 29

Assigned Reading for all SPMs: CCP-TP-002, Revision 26; CCP-TP-200, Revision 1

C225, Evaluation of Additional Containers for waste stream LA-MHD01.001, Jim Schoen, Various Dates

C344, Memorandum to File Re: Calculations to Predict the Maximum Amount of Nitrate Salts in Cement and Inorganic Sorbents, S. Schafer, August 2, 2016

C371, Acceptable Knowledge Assessment of Containers from Acceptable Knowledge Summary Report CCP-AK-LANL-006, Waste Stream LA-MHD01.001 Stored in the Waste Isolation Plant Waste Handling Building, M. Papp, October 17, 2016

C372, Acceptable Knowledge Assessment of Containers from Acceptable Knowledge Summary Report CCP-AK-LANL-006, Waste Stream LA-MHD04.001 Stored in the Waste Isolation Plant Waste Handling Building, M. Papp, April 25, 2016

C373, Chemical Compatibility Evaluation for Waste Stream LA-MHD01.001 – Waste Handling Building Containers (AK Source Document C373), J. Schoen, October 19, 2016

C375, Self-Disclosure of Non-Compliance Resulting from the Extent of Condition Review, Los Alamos National Laboratory Hazardous Waste Facility Permit No. NM0890010515, C. McMillan, LA-UR: 15-26713, Symbol: DIR-15-127, August 31, 2015

C386, Email from Mike Rivera to Kathy Leonard, "WMF-633 ARP Drums," M. Rivera, August 16, 2007

CCE01, Chemical Compatibility Evaluation for Waste Stream LA-MHD04.001 (WHB) AK Source Document CCE01, J. Schoen, Revision 0, February 28, 2017

CCE04, Chemical Compatibility Evaluation for Waste Stream LA-MIN03-NC.001, C. Walker, Revision 0, February 6, 2017

CCE05, Chemical Compatibility Evaluation for Waste Stream LA-MHD09.001, S. Schafer, Revision 0, February 28, 2017

CCE06, Chemical Compatibility Evaluation for Waste Stream LA-MHD01.001 Full Waste Stream, J. Schoen, February 6, 2017

CCP-AK-LANL-004, Central Characterization Program Acceptable Knowledge Summary Report for Los Alamos National Laboratory TA-50 Mixed Transuranic Waste, Waste Streams: LA-MIN03-NC.001, LA CIN02.001, LA-MHD09.001, Revision 11, April 08, 2013, Revision 12 Draft H, no date, Freeze File, February 9, 2017

CCP-AK-LANL-006, Central Characterization Program Acceptable Knowledge Summary Report for Los Alamos National Laboratory TA-55 Mixed Transuranic Waste, Waste Streams: LA-MHD01.001, LA CIN01.001, LA-MIN02-V.001, LA-MIN04-S.001, Revision 13, February 10, 2014, Freeze File, February 9, 2017

CCP-AK-LANL-008, Central Characterization Project Acceptable Knowledge Summary Report for Los Alamos National Laboratory Off-Site Source Recovery Project Sealed Sources, Waste Streams: LA OS 00 01.001, LA-OS-00-03 and LA-OS-00-04, Revision 9, May 3, 2012, Freeze File, March 23, 2016

CCP-AK-LANL-010, Central Characterization Program Acceptable Knowledge Summary Report for Los Alamos National Laboratory TA-21 DP West Facility, Waste Streams: LA MHD04.001, LA MSG04.001, Revision 6, February 14, 2013, and Revision 7 Draft E, no date

CCP-TP-005, Revision 23, CCP Acceptable Knowledge Documentation, Attachment 7 – Radionuclides, LA MIN03-NC.001, September 8, 2011, with attached memorandum

CCP-TP-005, Revision 24, CCP Acceptable Knowledge Documentation, Attachment 6 – Waste Form, Waste Material Parameters, Prohibited Items, and Packaging, LA-OS-00-01.001, July 18, 2012, with attached memorandum

CCP-TP-005, Revision 26, CCP Acceptable Knowledge Documentation, Attachment 6 – Waste Form, Waste Material Parameters, Prohibited Items, and Packaging, LA-CIN01.001, December 2, 2013, with attached memorandum

CCP-TP-005, Revision 26, CCP Acceptable Knowledge Documentation, Attachment 6 – Waste Form, Waste Material Parameters, Prohibited Items, and Packaging, LA-MHD01.001, January 2, 2014, with attached memorandum

CCP-TP-005, Revision 26, CCP Acceptable Knowledge Documentation, Attachment 6 – Waste Form, Waste Material Parameters, Prohibited Items, and Packaging, LA-MHD04.001, June 10, 2014, with attached memorandum

CCP-TP-005, Revision 26, CCP Acceptable Knowledge Documentation, Attachment 6 – Waste Form, Waste Material Parameters, Prohibited Items, and Packaging, LA-MIN03-NC.001, June 12, 2014, with attached memorandum

CCP-TP-005, Revision 26, CCP Acceptable Knowledge Documentation, Attachment 6 – Waste Form, Waste Material Parameters, Prohibited Items, and Packaging, LA-MHD09.001, June 13, 2014, with attached memorandum

CCP-TP-005, Revision 26, CCP Acceptable Knowledge Documentation, Attachment 7 – Radionuclides, LA CIN01.001, January 2, 2014, with attached memorandum

CCP-TP-005, Revision 26, CCP Acceptable Knowledge Documentation, Attachment 7 – Radionuclides, LA MHD01.001, January 6, 2014, with attached memorandum

CCP-TP-005, Revision 26, CCP Acceptable Knowledge Documentation, Attachment 7 – Radionuclides, LA OS-00-01.001, November 20, 2013, with attached memorandum

CCP-TP-005, Revision 26, CCP Acceptable Knowledge Documentation, Attachment 7 – Radionuclides, LA MHD04.001, June 10, 2014, with attached memorandum

CCP-TP-005, Revision 26, CCP Acceptable Knowledge Documentation, Attachment 7 – Radionuclides, LA MHD09.001, June 11, 2014, with attached memorandum

CCP-TP-005, Revision 26, CCP Acceptable Knowledge Documentation, Attachment 13 – CCP Waste Stream Characterization Checklist, LA-CIN01.001, Lots 106–113, March 31, 2014–July 17, 2014

CCP-TP-005, Revision 26, CCP Acceptable Knowledge Documentation, Attachment 13 – CCP Waste Stream Characterization Checklist, LA-MHD01.001, Lots 446–451, April 3–23, 2014

CCP-TP-005, Revision 26, CCP Acceptable Knowledge Documentation, Attachment 1 – Acceptable Knowledge Documentation Checklist, LA-CIN01.001, June 9, 2014

CCP-TP-005, Revision 26, CCP Acceptable Knowledge Documentation, Attachment 1 – Acceptable Knowledge Documentation Checklist, LA-MHD01.001, August 10, 2015

CCP-TP-005, Revision 26, CCP Acceptable Knowledge Documentation, Attachment 1 – Acceptable Knowledge Documentation Checklist, LA-OS-00-01.001, July 24, 2014

CCP-TP-005, Revision 26, CCP Acceptable Knowledge Documentation, Attachment 1 – Acceptable Knowledge Documentation Checklist, LA-MHD04.001, June 10, 2014

CCP-TP-005, Revision 26, CCP Acceptable Knowledge Documentation, Attachment 1 – Acceptable Knowledge Documentation Checklist, LA-MIN03-NC.001, June 10, 2014

CCP-TP-005, Revision 26, CCP Acceptable Knowledge Documentation, Attachment 1 – Acceptable Knowledge Documentation Checklist, LA-MHD09.001, June 19, 2014

CCP-TP-005, Revision 26, CCP Acceptable Knowledge Documentation, Attachment 4 – Acceptable Knowledge Source Document Information List, LA-CIN01.001, June 9, 2014

CCP-TP-005, Revision 26, CCP Acceptable Knowledge Documentation, Attachment 4 – Acceptable Knowledge Source Document Information List, LA-OS-00-01.001, August 5, 2015

CCP-TP-005, Revision 26, CCP Acceptable Knowledge Documentation, Attachment 4 – Acceptable Knowledge Source Document Information List, LA-MHD04.001, June 10, 2014

CCP-TP-005, Revision 26, CCP Acceptable Knowledge Documentation, Attachment 4 – Acceptable Knowledge Source Document Information List, LA-MIN03-NC.001, June 9, 2014

CCP-TP-005, Revision 26, CCP Acceptable Knowledge Documentation, Attachment 4 – Acceptable Knowledge Source Document Information List, LA-MHD09.001, June 9, 2014

CCP-TP-005, Revision 28, CCP Acceptable Knowledge Documentation, Attachment 4 – Acceptable Knowledge Source Document Information List, LA-MHD01.001, May 3, 2016

CCP-TP-005, Revision 29, CCP Acceptable Knowledge Documentation, Attachment 9 – Interface waste Management Documents List, LA-CIN01.001, January 9, 2017

CCP-TP-005, Revision 29, CCP Acceptable Knowledge Documentation, Attachment 9 – Interface waste Management Documents List, LA- MIN02-V.001, January 18, 2017

CCP-TP-005, Revision 29, CCP Acceptable Knowledge Documentation, Attachment 9 – Interface waste Management Documents List, LA- MIN04-S.001, January 19, 2017

CCP-TP-005, Revision 29, CCP Acceptable Knowledge Documentation, Attachment 9 – Interface waste Management Documents List, LA-MHD03.001, January 18, 2017

CCP-TP-005, Revision 29, CCP Acceptable Knowledge Documentation, Attachment 9 – Interface waste Management Documents List, LA-OS-00-01.001, January 31, 2017

CCP-TP-005, Revisions 27–29, CCP Acceptable Knowledge Documentation, Attachment 9 – Interface waste Management Documents List, LA-MHD01.001, January 26, 2016, April 18, 2016, January 9, 2017

Characterization Information Summary, WSPF No. LA-CIN01.001, Lots 106–113, May 15, 2014

Characterization Information Summary, WSPF No. LA-MDH09.001, Lots 25–28, May 15, 2014

Characterization Information Summary, WSPF No. LA-MHD01.001, Lots 446–451, May 15, 2014

Characterization Information Summary, WSPF No. LA-MHD04.001, Lots 71–79, April 24, 2014

Characterization Information Summary, WSPF No. LA-MIN03.001, Lots 85–91, May 15, 2014

Characterization Information Summary, WSPF No. LA-OS-00-01.001, Lot 86, April 20, 2016

D090, Results of Oxidizing Solids Testing – EMRTC Report FR 10-13, Graham Walsh, Research Scientist, EMRTC Report FR 10-13, April 12, 2012

D123, Los Alamos National Laboratory TA-50/21/63 Waste Management Operations Safety Analysis Report, TA-50 Radioactive Liquid Waste Treatment Facility, G. Gonzales, WASTEMGM-REPORT-002, Revision 1, October 1995

D140, Future Radioactive Liquid Waste Streams Study, A. Ray, LA-12667-MS, November 1993

D262, Test Plan for the Evaluation of In Situ Thermal Desorption and Grouting Technologies for Operable Unit 7-13/14; Appendices H through L – untitled, N. Yancey, et.al., INEEL/EXT-03-00059, Revision 0, October 2003

D263, Evaluation of Chemical Compatibilities of the OU 7-10 Glovebox Excavator Method Project, J. Dick, B. Burton, INEEL/EXT-01-01587, Revision 0, June 2002

D264, Engineering Design File Chemical Compatibility and Inventory Evaluation for the Accelerated Retrieval Project, R. Kimmitt, EDF-5307, Revision 2, October 16, 2014

D265, White Paper on Potential Hazards Associated with Contaminated Cheescloth Exposed to Nitric Acid Solutions, P. Hypes, September 20, 2016,

D266, Evaluation of the Reactivity/Flammability of Cellulosic Wipes and Towels Before and After Exposure to 12 Normal Nitric Acid, L. Peppers, D. Saiki, MST94-003, MST95-003, DOE No. 5280.3, June 1995

Document Review Records and final drafts for AKA01, AKA02, CCE04 and CCE06

DR121, Acceptable Knowledge Source Document Discrepancy Resolution – Drum Liners, S. Schafer, April 26, 2004

DR124, Historical and Current RCRA Characterization and Assignment of EPA Hazardous Waste Numbers, M. Papp, March 2, 2007

DR139, Removal of 3 Debris Drums from Waste Stream LA-MIN03-NC.001, A. Johns, February 27, 2014

DR140, Removal of 1 Debris Drums from Waste Stream LA-MIN03-NC.001, A. Johns, April 9, 2014

DR141, Removal of 1 Debris Drums from Waste Stream LA-MIN03-NC.001, A. Johns, April 3, 2014

DR149, Historical and Current RCRA Characterization and Assignment of EPA Hazardous Waste Numbers for Waste Stream LA-CIN04.001, M. Papp, June 18, 2014

M154, Miscellaneous MSDSs, Miscellaneous Manufacturers, various dates

M315, Box Lines Repackaging Paperwork for LA-MHD01.001, various dates

M367, TA-50/54 Repackaging Waste Profile Forms, various authors, various dates

M368, TA-55 Waste Profile Forms, various authors, various dates

M383, A Review of Assignment of U.S. Environmental Protection Agency Hazardous Waste Numbers to Selected Wastes Stored at the INEEL RWMC, K. Gilbert, T. Venneman, no date

M387, Waste Stream LA-MHD01.001 WCS Population TWSRs and RSWDs, LANL, various dates

M418, Probative Investigation of the Thermal Stability of Wastes Involved in February 2014 WIPP Waste Drum Breach Event, R. Scheele et.al., PNNL-24125, March 2015

M420, Summary of Evaluation and Identification of LANL Nitrate Salt Containers, Los Alamos National Laboratory, May 29, 2014

M422, Waste Stream LA-CIN01.001 Container Evaluation – Initial WCS Population, LANL, various dates

M424, LA-MHD04.001 WCS AKA Container Paperwork, LANL, various dates

NCRs: NCR-LANL-0138-16 and NCR-LANL-0156-17

OSRP D051, 2015 TA-55 Technical Safety Requirements, Los Alamos National Laboratory (LANL), TA55-TSR-2015, Revision 0.1, 2015

OSRP D052, 2015 Documented Safety Analysis, Los Alamos National Laboratory (LANL), TA55-DSA-2015, Revision 0.1, October 2015

OSRP P001, CCP Sealed Source Visual Examination and Packaging, Central Characterization Program (CCP), CCP-TP-069, Revision 6, June 6, 2013

OSRP P002, CCP Off-Site Source Recovery Project Sealed Source Radiological Characterization, Central Characterization Program (CCP), CCP-TP-101, Revision 7, August 13, 2013

OSRP P008, Surveying for Fixed and Removable Contamination, Matthew Griffin, RP-SOP-037, Revision 1, September 2, 2015

OSRP P009, Supporting Packaging, Receipt, and Transportation of Non-RP Radioactive Materials, Charles J. Bianconi, RP-SOP-008.004, Revision 4, February 19, 2015

OSRP P010, Surveying for External Radiation, Charles J. Bianconi, RP-1-DP-036.11, Revision 11, June 10, 2014

OSRP P011, LANL Waste Acceptance Criteria, P390-1, Revision 6, March 10, 2014

OSRP P012, CCP Container Management, Central Characterization Program (CCP), CCP-TP-120, Revision 16, June 18, 2013

OSRP P013, Off-Site Source Recovery Material Staging at TA-55, Los Alamos National Laboratory (LANL), TA-55-DOP-901, Revision 7, January 15, 2015

OSRP P014, DOT 7A/Type A Containers, Vents, In-Service Inspection, Los Alamos National Laboratory (LANL), TA55-ISI-6215, Revision 1.1, October 15, 2015

OSRP P015, TA-54 Area G TRU Waste Receipt, Storage, and Transfer, Paul Newberry, EP-AREAG-WO-DOP-1086, Revision 4, December 17, 2015

P089, Packing Oversized TRU Waste into Approved Containers, K. Lacy, PA-DOP-01450, Revision 5, September 12, 2016, and previous revisions

P096, TA-55, TA-50 RLWTF, RLUOB, and CMR Waste Management Requirements, K. Lacy, TA55-RD-539, Revision 6, January 26, 2016, and previous revisions

P099, Packing TRU Waste into Approved Containers, K. Lacy, PA-DOP-01456, Revision 3, November 1, 2016, and previous revisions

P101, Packing TRU Waste into Pipe Overpack Containers, K. Lacy, PA-DOP-01462, Revision 5.1, September 30, 2015, and previous revisions

P236, LANL Waste Management, LANL, P409, Revision 5, July 30, 2015, and previous revisions

P333, Waste Compliance and Tracking System (WCATS) Version 2 User's Manual, A. Montoya, MAN-5004, Revision 3, July 16, 2015, and previous revisions

P335, Drum-in/Drum-out Operations in Cement Fixation, C. Smith, PMT2-DOP-CF-002, Revision 4, July 14, 2014, and previous revisions

P336, Non-evaporator Solution Operations for Cement Fixation, C. Finstad, PMT2-DOP-CF-005, Revision 3-IPC1, July 30, 2014, and previous revisions

P347, CMR Waste Management Requirements, J. Rodriguez, CMR-RD-007, Revision 2.2, January 12, 2016, and previous revisions

P348, CMR Facility Chemical Management Requirements, V. Salazar, CMR-RD-008, Revision 4.1, September 30, 2016, and previous revisions

P351, Processing CMR Waste, K. Lacy, PA-DOP-01557, Revision 1, December 21, 2016, and previous revision

P368, Shipment and Disposal of Solidified Organic Waste (Waste Type IV) to the Waste Isolation Pilot Plant (WIPP), Presented at WM'06 Conference, E.I. D'Amico, Washington TRU Solutions, D.R. Edmiston, John Hart & Associates, G.A. O'Leary, CH2M-WG Idaho, LLC, M.A. Rivera, Aspen Resources Ltd, Inc., D.M. Steward, Boulder Research Enterprises, LLC, February 26–March 2, 2006

RTR BDRs: LA-RTR2-13-0101, LA-RTR2-13-0153, LA-RTR2-14-0015, LA-RTR2-14-0016

SPM Qualification Cards for T. Groover (12/4/2014), J. Knox (10/23/2013), C. Soaterna (5/31/2011), D. Wade (10/23/2013), R. Whiteaker (5/3/2012), R. Whitely (10/31/2013)

Waste Stream Profile Form, Waste Stream Profile Number: LA MHD04.001, April 8 2009, Change Notice No. 1, May 6, 2009, with associated attachments

Waste Stream Profile Form, Waste Stream Profile Number: LA-CIN01.001, June 28, 2010, with associated attachments

Waste Stream Profile Form, Waste Stream Profile Number: LA-MHD01.001, May 30, 2013, with associated attachments

Waste Stream Profile Form, Waste Stream Profile Number: LA-MHD09.001, August 22, 2011, with associated attachments

Waste Stream Profile Form, Waste Stream Profile Number: LA-MIN03-NC.001, May 11, 2006, Change Notice No. 1, April 16, 2008, Change Notice No. 2, May 24, 2010, with associated attachments

Waste Stream Profile Form, Waste Stream Profile Number: LA-OS-00-01.001, May 11, 2006, Change Notice No. 1, December 5, 2006, Change Notice No. 2, June 15, 2010, with associated attachments

Nondestructive Assay

CCP-CH-LANL-NDA-HENC3-OL-2017; HENC3, LANL, TA-55; LANL HENC 3 Operational Log

CCP-INL-HENC-001, CCP HENC Supplemental Calibration, Confirmation and Verification Report, Revision 0, April 28, 2005

CCP Standing Order CCP-SO 65, NDA Instrument Adjustments, November 24, 2014, Revision 0

CCP Standing Order CCP-SO LANL 74, TA-55 NDA Reporting Requirements, Revision 1, May 23, 2016

CCP Standing Order CCP-SO LANL 76, Implementation of CCP-TP-068, Revision 0, May 26, 2016

CCP Standing Order CCP-SO LANL 78, Elimination of HENC 3 Pulser, Revision 0, October 28, 2016

CCP-TP-103, CCP Data Reviewing, Validating and Reporting Procedure for the High-Efficiency Neutron Counter Using NDA 2000, Revision 13, August 30, 2016

CCP-TP-107, CCP Operating the LANL TA-55 High-Efficiency Neutron Counter Using NDA2000, Revision 15, September 13, 2016

CCP-TP-108, Calibrating the LANL TA-55 High-Efficiency Neutron Counter, Revision 9, December 21, 2016

HENC#3 Calibration Verification, January 5, 2017

LA-CIN01.001 AK-NDA Memorandum, Revision 1, December 12, 2012

LA-MHD01.001 AK-NDA Memorandum, Revision 8, March 3, 2010

LANL HENC3 Batch Data Report Nos. 5LANDA0029, 5LANDA0035 and 5LANDA0050

LANL-HENC3-NDA-101, Calibration Report for the HENC 3 at the Los Alamos National Laboratory TA 55 Facility, Revision 1, February 2, 2015, and Revision 2, June 16, 2015

LANL-HENC3-NDA-101, Addendum to HENC 3 Calibration Report for the HENC 3 at the Los Alamos National Laboratory TA 55 Facility, Revision 3, October 21, 2015

LANL-HENC3-TMU-101, Total Measurement Uncertainty for the HENC #3 with Integral Gamma Spectrometer, Revision 0, April 24, 2014

List of Qualified Individuals, February 8, 2017

Memorandum: HENC 3 Neutron Totals Background Limit Change, J. Wachter, January 8, 2015

Operator Aid, No. OA-NDA-007, TA-55 Container Parameters, Revision 3, January 15, 2015

Operator Aid, No. OA-NDA-008, Revision 3, September 22, 2016

Operator Aid, No. OA-NDA-009, HENC#3 Container Management – VPM Hold Tags, Revision 1, May 23, 2016

Visual Examination

CCP-AK-LANL-006, Acceptable Knowledge, Revision 13

CCP-PO-005, CCP Conduct of Operations, Revision 27

CCP-QP-002, CCP Training and Qualification Plan

CCP-QP-005, CCP TRU Nonconforming Item Reporting and Control, Revision 23

CCP-QP-008, CCP Records Management, Revision 26

CCP-TP-005, CCP Acceptable Knowledge Documentation, Revision 26

CCP-TP-068, CCP Container Management, Revision 12

CCP-TP-069, CCP Sealed Source Visual Examination and Packaging, Revision 6

CCP-TP-113, CCP Standard Contact-Handled Waste Visual Examination, Revision 20

LANL NDE Personnel Waste Streams Qualified List, February 9, 2017

List of Non-Conformance Reports

Lists of Qualified Individuals for TA-55, CMR and OSRP VE Personnel dated February 9, 2017

VE BDR LAVE030063, February 15, 2017

Visual Examination Operator/Independent Technical Reviewer Qualification Cards VE-01, Revision 6 for CMR and TA-55 VE Personnel, and VE-OSRP-01 Revision 8 for OSRP VE Personnel, for: Tommy Mojica, Sylvia Alvarado, Levie Archuleta, Dino Bustos, Jason Krylowicz, Brian Manzanares, Loretta Ortega, Eddie Rios, Luis Romero, Adam Segovia, Kenneth Salazar, Martin Salazar, Justin Griffin, Jerry McAlpin, Ioana Witkowski, Margaret Sudderth, William Stewart, Anthony Nettleton, James Matzke, Brandon Martinez, Adam Martinez, Leo Manzanares, Lorraine Hauschild, Michael Gurley, Alex Feldman, Michael Fanning, Katherine Drypolcher, James Cole, Frank Cocina, Cristy Abeyta and Michael Trujillo

Waste Data System

DOE/WIPP-02-3122, Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant, Revision 8, July 5, 2016

DOE/WIPP-09-3427, Waste Data System User's Manual, U.S. Department of Energy, Revision 14, January 19, 2017

NTP-WDS-ATR-0011, Waste Data System (WDS) Version 2.7.2 Acceptance Test Report, Revision 0, October 2016

Payload Assembly Transportation Certification Document (unsigned) for Payload ID: PAY-055, provided to EPA February 14, 2017

Screenshot of Successful Payload Submission for Payload Plan ID 145097, provided to EPA February 14, 2017

Screenshots for Test Case 13 from NTP-WDS-ATR-0011

Screenshots for Test Case 14 from NTP-WDS-ATR-0011

Screenshots for Test Case 15 from NTP-WDS-ATR-0011

WDS Waste Isolation Plant Container Data Reports for Container Nos. CSK200201O, HBL120591, HBL130003, HBL130011, HBL130012, SR123429A and SR500417A, provided to EPA February 22, 2017