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

COPY

OFFICE OF
AIR AND RADIATION

R. Paul Detwiler, Acting Manager
Carlsbad Field Office
U.S. Department of Energy
P.O. Box 3009
Carlsbad, NM 88221-3090

Dear Dr. Detwiler:

This letter provides the results of the U.S. Environmental Protection Agency's (EPA or we) Inspection Number EPA-LANL-CCP-4.04-08. The EPA inspected the waste characterization activities of the Central Characterization Project (CCP) implemented at the Los Alamos National Laboratory (LANL) from April 26-30, 2004. This report is issued in accordance with our regulations at 40 CFR 194.8(b)(3) and 40 CFR 194.24.

We determined that the transuranic (TRU) waste characterization systems and processes implemented by the CCP at LANL, examined during the inspection, and discussed in the enclosed report were adequate. During the course of the inspection, we evaluated CCP's capabilities to characterize LANL's retrievably-stored contact-handled TRU debris (S5000) and solid (S3000) waste. EPA identified no findings and six concerns, none of which require a response from Department of Energy (DOE) at this time. We will verify steps taken to address these concerns during a future inspection.

If you have any questions, please contact Rajani Joglekar at (202)-343-9462.

Sincerely,

Bonnie C. Gitlin, Acting Director
Radiation Protection Division

Enclosure

cc: Kerry Watson, CBFO
Ava Holland, CBFO

cc (w/o enclosure):
Lynne Smith, DOE-EM

UNIQUE #	DOE UFC	DATE REC'VD	ADDRESSEES
0404333	2300.00	AUG 10 2004	P. Detwiler, R. Chavez, L. Piper, A. Holland, K. Watson, R. Nelson, J. Zwick, R. McCallister

DOCKET NO: A-98-49, Item II-A4-43

WASTE CHARACTERIZATION REPORT

EPA INSPECTION NO. EPA-LANL-CCP-4.04-08
of the
CENTRAL CHARACTERIZATION PROJECT (CCP)
as implemented at the
LOS ALAMOS NATIONAL LABORATORY
April 26 – April 30, 2004

U.S. Environmental Protection Agency
Office of Radiation and Indoor Air
Center for Federal Regulations
1200 Pennsylvania Ave, NW
Washington, D.C. 20460

August 2004

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

In accordance with 40 CFR 194.8, from April 26-30, 2004, the U.S. Environmental Protection Agency (EPA or the Agency) conducted EPA inspection number EPA-LANL-CCP-4.04-8 of the Central Characterization Project (CCP) as implemented at the Los Alamos National Laboratory (LANL) in New Mexico to verify that waste proposed for disposal in the Waste Isolation Pilot Plant (WIPP) could be characterized as required by 40 CFR 194.24(c)(4). EPA must verify compliance with 40 CFR 194.24 before waste may be disposed of at WIPP, as specified in Condition 3 of the Agency's certification of the WIPP's compliance with disposal regulations for transuranic (TRU) radioactive waste (63 Fed. Reg. 27354, 27405, May 18, 1998). The waste characterization (WC) systems and processes that EPA inspected were Acceptable Knowledge (AK); Non-Destructive Assay (NDA); Non-Destructive examination (NDE) including Visual Examination (VE) and Radiography (RTR); and data transfer using the WIPP Waste Information System (WWIS), all used to characterize or track contact-handled retrievably-stored debris (S5000) and solid (S3000) waste.

EPA's inspection team determined that CCP at LANL's WC activities using AK, NDA systems - High Efficiency Neutron Counter (HENC) and Portable Tomographic Gamma Scanner (PTGS)- VE, RTR, and the WWIS, as inspected, can adequately characterize contact-handled (CH) retrievably-stored debris (S5000) and solid (S3000) waste. EPA's inspection team identified no findings and six concerns as a result of its inspection, none of which requires a response from DOE at this time. EPA will verify steps taken to address these concerns during a future inspection.

2.0 PURPOSE OF INSPECTIONS

On May 18, 1998, the U.S. Environmental Protection Agency (EPA or Agency) certified that the Waste Isolation Pilot Plant (WIPP) will comply with the radioactive waste disposal regulations at 40 CFR 191. In this certification, EPA also included Condition No. 3 which states that "the Secretary shall not allow shipment of any waste from . . . any waste generator site other than LANL [Los Alamos National Laboratory] for disposal at the WIPP until the Agency has approved the processes for characterizing those waste streams for shipment using the process set forth in § 194.8." The approval process described at 40 CFR 194.8 requires the Department of Energy (DOE or Department) to: (1) provide EPA with information on process knowledge[1] for waste streams proposed for disposal at WIPP, and (2) implement a system of controls used to confirm that the total amount of each waste component that will be emplaced in the WIPP will not exceed limits identified in the WIPP Compliance Certification Application (CCA). An EPA inspection team visits the site to verify through a demonstration that process knowledge and other elements of the system of controls are technically adequate and are being implemented properly. Specifically, EPA's inspection team verifies compliance with 40 CFR 194.24(c)(4), which states:

> *** Any compliance application shall: *** Provide information which demonstrates that a system of controls has been and will continue to be implemented to confirm that the total amount of each waste component that will be emplaced in the disposal system will not exceed the upper limiting value or fall below the lower limiting value described in the introductory text of paragraph of this section.[2] The system of controls shall include, but shall not be limited to: measurement; sampling; chain of custody records; record keeping systems; waste loading schemes used; and other documentation.

In other words, the purpose of inspections is to verify that the DOE waste generator sites, which characterize transuranic (TRU) waste prior to shipment to WIPP, are characterizing and tracking the waste in such a manner that EPA is confident that the waste will not exceed the approved limits. By approving waste characterization (WC) systems and processes at LANL as implemented by the Central Characterization Project (CCP), EPA has evaluated capabilities of those systems and processes to accomplish two tasks: (1) they can identify and measure the waste components (such as plutonium) that must be tracked for compliance;[3] and (2) they can

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[1] Process knowledge refers to knowledge of waste characteristics derived from information on the materials or processes used to generate the waste. This information may include administrative, procurement, and quality control documentation associated with the generating process, or past sampling and analytic data. Usually, the major elements of process knowledge include information about the process used to generate the waste, material inputs to the process, and the time period during which the waste was generated. In the context of these reports specifically and waste characterization generally, EPA uses the term "acceptable knowledge" synonymously with "process knowledge."

[2] The introductory text of paragraph 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."

[3] The potential contents of a waste stream or group of waste streams determine which processes can adequately

confirm that the waste in any given container has been properly identified as belonging to the group of approved waste streams. Under 40 CFR 194.8(b)(4), EPA is authorized to perform follow-up inspections to verify that a TRU waste site is properly characterizing the relevant waste streams and that it is shipping waste that belongs only to those waste streams or groups of waste streams that have been characterized by the approved WC processes.

3.0 PURPOSE OF THIS REPORT

This WC inspection report documents the basis for EPA's approval decision and explains the results of Inspection No. EPA-LANL-CCP-4.04-8 in terms of findings or concerns. The report, if applicable, provides objective evidence of outstanding findings (nonconformances) in the form of documentation. The report also describes any tests or demonstrations completed during the course of the inspection. The completed checklists attached to the report show the documents (principally procedures) that EPA's inspection team reviewed. If you wish to see any items identified in the attached checklists, please contact:

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

EPA's decision to approve or disapprove the system of controls (processes) used to characterize one or more waste streams at a site is conveyed to DOE separately by letter, in accordance with 40 CFR 194.8(b)(3). This report identifies and explains the basis for EPA's decision as contained in the letter. EPA's approval or disapproval extends only to the processes reviewed during the inspection and identified in this report and its attachments. Only waste that can be adequately characterized using processes verified by EPA through inspections may be shipped to WIPP for disposal. Also, approved processes may be used to characterize not just existing waste, but also waste belonging to the subject waste stream(s) that will be generated in the future.

4.0 SCOPE OF INSPECTION

The scope of Inspection No. EPA-LANL-CCP-4.04-8 incorporated the determination of technical adequacy of the system of controls used to characterize radionuclides, including Acceptable Knowledge (AK), Non-Destructive Assay (NDA) using the MCS HENC#1 and PTGS systems, Visual Examination (VE), Real-Time Radiography (RTR) and data transfer through the WIPP Waste Information System (WWIS). EPA had previously approved contact-handled (CH) retrievably-stored solid and debris waste, as well as CH newly-generated debris waste at the LANL under the site-specific program. Since that approval, in Fall 2003, however, LANL's CH

characterize the waste. For example, if acceptable knowledge information suggests that the waste form is heterogeneous, the site should select a nondestructive assay technique that suits such waste in order for adequate measurements to be obtained. Radiography and visual examination help both to confirm and quantify waste components such as cellulosics, rubbers, plastics, and metals. Once the nature of the waste has been confirmed, the assay techniques then quantify the radioactive isotopes in the waste. In the given example, a TRU waste site may be able to characterize a wide range of heterogeneous waste streams or only a few. EPA's inspection scope is governed by a site's stated limits on the applicability of proposed waste characterization processes.

TRU waste certification was revoked by CBFO. As a result, LANL decided against pursuing its own TRU WC activity and contracted services of the CCP for characterizing its waste. EPA's April 26-30 inspection, therefore, focused on the CCP's TRU WC processes at LANL and this approval is of that program alone. Any resumption of LANL site-specific CH TRU programs will require EPA review and approval before LANL can dispose of the waste characterized under its site-specific program.

At the time of Inspection No. EPA-LANL-CCP-4.04-8, the procedures and activities reviewed by EPA were being used to characterize CH retrievably-stored solid (S3000) and debris (S5000) TRU waste using AK, NDA, VE and RTR. Data transfer using the WWIS was also assessed.

5.0 DEFINITIONS

Finding: A determination that a specific item or activity does not conform with 40 CFR 194.24(c)(4). A finding requires a response from the Carlsbad Field Office (CBFO).

Concern: A judgment that a specific item or activity may or may not have a negative effect on compliance and, depending on the magnitude of the issue, may or may not require a response.

6.0 INSPECTION TEAM

The members of the EPA waste characterization inspection team are identified below.

Inspection Team Member	Position	Affiliation
Ms. Rajani Joglekar	Inspection Team Leader	EPA
Mr. Ed Feltcorn	Inspector	EPA
Mr. Jerry Rossman	Inspector	Trinity Engineering Associates
Ms. Connie Walker	Inspector	Trinity Engineering Associates
Mr. James Oliver	Inspector	Trinity Engineering Associates
Dr. David Stuenkel	Inspector	Trinity Engineering Associates

Numerous DOE CBFO and LANL personnel, including both DOE staff and support contractors, participated in EPA's inspection, in addition to performing a separate DOE audit of the same processes. Mr. Earl Bradford, CBFO Audit Team Leader, served as DOE's primary point of contact with EPA's inspection team. CBFO's audit team was supported by the CBFO Technical Assistance Contractor (CTAC).

LANL is located approximately 25 miles north of Santa Fe, New Mexico, and encompasses approximately 43 square miles. As described in AK documentation, the primary mission of

LANL has been nuclear weapons research and development (R&D), but its current mission supports civilian defense and industrial clientele. LANL was the first site authorized by EPA to ship waste to WIPP. However, in the fall of 2003, the DOE identified issues with the site-run characterization program at the facility, and DOE revoked LANL's certification at that time. Since then, the CCP has assumed CH TRU waste certification activities at the site, and the purpose of this inspection was to assess the CCP's characterization program.

7.0 PERFORMANCE OF THE INSPECTION

EPA Inspection No. EPA-LANL-CCP-4.04-8 took place from April 26-30, 2004. The inspection involved the following elements of LANL's TRU WC program: AK; NDA using the HENC and PTGS; NDE using VE and RTR; and data transfer using the WWIS. This element constitutes a sampling of the "system of controls" for WC that is identified in 40 CFR 194.24(c)(4).

EPA examined all of the above processes to determine whether LANL demonstrated compliance with 40 CFR§194.24 for the waste streams being examined. The checklists used by EPA inspectors for the AK, NDA, NDE, and WWIS evaluations are included in Attachments A.1 through A.5. The checklists identify the objective evidence reviewed by EPA.

The inspection was conducted in the following steps:

1) preparation of draft checklists prior to the inspection;
2) review of the results of EPA's and CBFO's recent audits of LANL, including findings/concerns identified by EPA and corrective actions required by CBFO (this background information suggests potential areas of inquiry during interviews);
3) review of site procedures and other information, and modification of EPA checklists, if necessary, to incorporate site-specific information; and
4) on-site verification of the technical adequacy or qualifications of personnel, procedures, and equipment by means of interviews and demonstrations.

The following subsections address the results of EPA's inquiries into each technical area in turn. The checklists attached to this report (Attachments A.1 - A.5) identify, as appropriate, key documents that the EPA inspection team reviewed, key site personnel who were interviewed, and key demonstrations that were performed. Key personnel interviewed are as follows:

Personnel	Organization	Area of Expertise
Kevin Peters	Technical Specialists, Inc.	Acceptable Knowledge
Mark Doherty	Technical Specialists, Inc.	Acceptable Knowledge
Steve Shaffer	Wastren	Acceptable Knowledge
Randy Fitzgerald	Technical Specialists, Inc.	Acceptable Knowledge
Robert Ceo	Canberra Industries	Nondestructive Assay
Joseph Wachter	LANL	Nondestructive Assay
Craig Davidson	Canberra Industries	Nondestructive Assay

John Veilleux	RRES	Nondestructive Assay
Bruce Gillespie	Mobile Characterization Services (Observer)	Nondestructive Assay
Joe P. Harvill	CCP	Nondestructive Assay
Doug Cramer	LANL	Nondestructive Assay
Robert Owczarek	LANL	Nondestructive Assay
Harald Poths	LANL	Nondestructive Assay
Leon Martinez	LANL/CCP	Radiography
Paul Martinez	LANL/CCP	Radiography
Jack Vigil	LANL/CCP	Radiography
Andrew Adams	LANL/CCP	Visual Examination
Ricky Baros	LANL/CCP	Visual Examination
Tommy Mojica	LANL/CCP	Visual Examination
Joe Valdez	LANL/CCP	Visual Examination
J. R. Stroble	CCP	WWIS
Barbara Trujillo	LANL/CCP	WWIS
Deborah Freeze	CCP	WWIS

7.1 Acceptable Knowledge (AK)

EPA examined the AK process and associated information to determine whether LANP CCP demonstrated compliance with §194.8 requirements for LANL's CH retrievably-stored TRU solid (S3000) and debris (S5000) waste. As part of the inspection, EPA reviewed the elements of the AK process listed below. The checklist at Attachment A.1 identifies the objective evidence reviewed by EPA:

- Overall procedural technical sufficiency and scope, and ability to follow the acceptable knowledge WC process for containers and waste streams;
- Waste generating procedures, processes and documentation;
- Characterization of required waste material parameters and radionuclides;
- AK information assembly and compilation;
- AK confirmation and associated discrepancy resolution;
- Sufficiency of AK characterization results;
- Assembly of required information and use of supplemental information;
- AK summary preparation;
- Reassignment of waste stream due to AK and discrepancy analysis; and
- AK Accuracy.

AK is used to determine several aspects of TRU wastes at LANL, including but not limited to:

Defense waste status,

Material parameters,

Waste stream,

Radionuclide information, and

Waste matrix codes.

During the inspection, EPA inspectors examined several procedures and documents, including the following:

NCR Reports: LANL 0611-04 container LA00000059315, LANL 0610-04 container LA00000059075, LANL 0704-04 Container S870645, LA0608 drum S850595

Reference M012 Waste Stream LA-NHD01.001 Waste Material Parameter Evaluation (AK only), February 24, 2004

LANL AK Tracking spreadsheet, print out April 27, 2004

Reference U002, Review of RTR Data from PRE WAP analysis for AK spreadsheet, 1/21/03

Waste Stream Profile Form, LA-MIN03-NC.001, Homogenous Inorganic Solids, Draft April 27, 2004

Waste Stream Profile Form, LA-NHD01.001, TA-55 Non-Hazardous Heterogenous Debris, April 27, 2004

CCP-TP-005, Revision 13, CCP Acceptable Knowledge Documentation, Effective Date 11/18/2003

Los Alamos National Laboratory TA-55 Non-Hazardous heterogeneous Debris Waste Stream Acceptable Knowledge Summary report, CCP-AK-LANL-005, Revision 0, March 17, 2004

Los Alamos National Laboratory TA-50 Radioactive Liquid Waste Treatment Facility Homogenous Inorganic Solids Non-Cemented Waste Stream lA-MIN-03-NC.001, Revision 0, February 24, 2004

CCP-TP-001, Revision 10, CCP Project level Data Validation and Verification, Effective Date 8/28/2003

C033, Interview with Jim Foxx by Kevin Petters, RE: P/S codes SS, CA and BC for TA-55 Debris

M017, MSE Process Procedure Data, April 10, 1996

M022 Measuring Physical Properties, MET 41, 9/9/99

P014 Final Safety Analysis Report for TA-55 NMT, July 13, 1995

C035, Secondary Radionuclides and Toxic Metals in TA-55 TRU Waste, Sept 5, 1997

M026, MSDS, SGF-21 3M Brand secondary Fluid containing perfluoro compounds, dated

2002

D005, Acceptable Knowledge Report for Debris Waste containing Pu-239, 4/9/03

M009, Documentation for RadWaste ORACLE Database's List of Acceptable Radioisotopes, Specific Activities, Categories, and Regulatory Limits, February 3, 1992

D006, Acceptable Knowledge Information Summary for LANL Transuranic Waste Streams, 9/22/03

Memorandum, to CCP Central Records, form Wesley G Estill, Re: Evaluation of the Radiological Characterization of LA-MIN03-NC Waste Stream (solid) dated April 22, 2004

DOE Waste Treatability Group Guidance, January 1995

Contact Handled Transuranic Waste Acceptance Criteria (WAC) for the Waste Isolation Pilot Plant Rev 1 effective date March 1, 2004

CCP Acceptable Knowledge Confirmation Checklist for LA-NHD01.001, TA-55 non hazardous debris waste stream, dated 4/26/04

CCP-TP-005 Completed Attachments for Heterogeneous Debris; Attachments 1, 4, 5, 6, 7, 8

DR002, Discrepancy Resolution, Radiological Characterization for U238 in TA-50 wastewaters (assuming that quantity of U238 is equal to U235), dated

DR001 Discrepancy Resolution, EPA Hazardous Waste Numbers, Waste Stream LA-MIN03-NC, 4/16/04

CCP-TP-005 Completed Attachments for Hazardous non-cemented Sludge from TA-50; Attachments 1, 4, 5, 6, 7, 8

C014, Interviews of Radioactive Liquid Waste Knowledgeable Personnel, 3/23/04

D004, AK Summary Report for Waste Stream TA-50-19, Vacuum Filter Cake, 3/23/04

C019, Radiological Evaluation, Julia Witworth April 4, 2004

D018 Waste Management Site Plan, LA-UR-80-2836, October 1980

C013, Memo to B. Garcia from J.Plum, Re-Characterization of Wastewater Treatment Sludge in Storage at Technical Area (TA) 54- Request for removal from Federal Facility Compliance Order, January 12, 1996

D041, Wastewater Strea, Characterization for TA-3-16...2121, Santa Fe Engineering Ltd., October, 1992

D050, Decontamination and Size Reduction of Plutonium Contaminated Process Exhaust Ductwork and Glove Boxes, Los Alamos National Laboratory, November 15, 1996

D043, Waste Stream Characterization for TA-3-32...1750, Santa Fe Engineering Ltd., October, 1992

D039, Waste Water Stream Characterization for TA-59, Santa Fe Engineering Ltd., September, 1992

D074, Final TRU Waste Inventory Work-Off Plan, LA-UR862932, J Warren and A. Dross, August, 1986

C017, Interview with Dave Moss, Julia Whitworth, dated 11/3/03; re: outstanding question on Vacuum filter Sludge Waste

D075, A Newly Continuously Monitored Collection System for Liquid Industrial Wastes, L. Emelity et al October 6, 1983

M007, Attachments Related to TA-50, Building 1, August 1994

M117, Annual/Monthly TA-50 Influent and Effluent Radiological and Chemical Data Compiled from Facility Reports, 1979-1990

M025, Acceptable Knowledge Personnel Interview Form, Dave Olivas, Charles Rense interviewed, TWCP -03541, March 2, 2000

M022, Interview, John Musgrave, dated 9/8/99 Process Description PF-4, etc.

M018, Spreadsheet, Area G Rad Values from Opp, 10/6/03

M015 Area G MIN03 Data from VA, 10/15/03 (TA 54 Database printout of all containers)

M014, AKIS Rev 19 Draft, 9/16/03, complete listing of sludge drums

D027, Final Project Report, TA-2 Water Boiler Reactor Decommissioning Project, G. Montoya, LA-12049, undated report.

D040, Wastewater Stream Characterization for TA-2-1....70, Santa Fe Engineering ltd., May 1993

D025, Future Radioactive Liquid Waste Streams Study, Alfredo Rey, LA-12667-MS, November, 1993.

D005, Los Alamos National Laboratory TA-50/21/63 Waste Management Operations Safety Analysis Report, TA-5- Radioactive Liquid Waste Treatment Facility, LA-UR-94-1141, March 1994

C004, Memo to G.Kestell et al, the Effects of TA-55 Process Wastes on TA-50- Operations, September 18, 1980.

D029, Work Release #24, Study of Alternatives for Radioactive Wastewater Treatment Sludges, Ralph M. Parsons Company, August, 1993

D030, Review of Radioactive Liquid Waste Management at Los Alamos, L. Emelity, J.Bucholz, and P.McGinnis, LA-UR-77-1195, May, 1977

CCP Radiography/Visual Examination Comparison Report, Drum S850143, S850174, S850252, S850163, S850170, S850176, S850201

Acceptable Knowledge Accuracy Report for Waste Stream LA-MIN03-NC.001/Homogenous Inorganic Sludge ; memo from James L. Maupin, SPQAO to Mark Doherty, 4/27/03

CCP Radiography/Visual Examination Comparison Report, Drums 59032, 59019, 59043, 59047

Management Assessment Report, MA-CCP-0009-03 for Hanford CCP; dated

11/20/03.(general WAP Assessment)

C034, Secondary Radionculides and Toxic Metals in TA-55 TRU Waste, C.L. Fox, A. Montoya NMT-7-WM/EC-97-156, September 5, 1997

The following drums and associated data packages were also examined:

Drum ID	**Radioassay Data Package**	**VE Data Package**	**RTR Data Package**
LA00000059019	LANDA002	LA-VE-500002	LA-RTR-04-0001
LA00000059032	LANDA001	LA-VE-500001	LA-RTR-04-0001
LA00000059043	LANDA002	LA-VE-500003	LA-RTR-04-0001
LA00000059047	LANDA001	LA-VE-500005	LA-RTR-04-0001
LAS870643	LANDA0005	LA-VE-500004	LA-RTR-04-0002
LAS870645	LANDA0005	LA-VE-500004	LA-RTR-04-002
LAS860306	LANDA004	-------------------	LA-RTR2-04-0001

The inspection team reached the conclusions listed below.

The AK Summaries were adequately assembled and generally provided sufficient detail.

The AK Summaries CCP-AK-LANL-004 (waste water treatment sludges) and CCP-AK-LANL-005 (TA-55 debris) were assembled appropriately and in general included much of the required information. For example, Section 5.4.2 of the LA-MIN03-NC (sludge) AK Summary Report (AKS) contained a significant amount of information and showed thoroughness in its assembly and interpretation. However, AKS reports lacked information to show compliance with certain portions of the waste analysis plan (WAP), and the reports needed refinement to ensure correct interpretation of data presented. The following are specific examples pertinent to wastewater treatment sludges:

- Waste volume by year to understand how volume/input changes have occurred during the waste stream generation period;
- Discussion of the waste by nuclide (current mixed; this approach could help clarify input/time) or add subsection headings to the text to clearly delineate that the individual paragraphs discuss all data from a data source;
- If it enhances readability, include section with header addressing data discrepancy or data interpretation challenges (this might help explain differing statements regarding, for example U235 based on data sources); and/or
- Provide a concluding statement regarding the use of AK data for determining specific isotopic ratios/distribution on a drum basis (for use in NDA).

The data assembly process at LANL was complicated by the fact that the site had no site-wide tracking system for containers shipped to WIPP. Some DOE sites (e.g., Rocky Flats) have such systems/databases in place. Development of this system would be useful, particularly since it appeared that site AK Experts (AKE) were required to search several different and potentially competing databases for information. At the time of the inspection, the AKS only produced information on the greater-than-100 nCi/g component of the waste, stating that the low-level component was typically segregated and implied that it had been managed separately (at least for wastewater treatment sludge). That is, waste below 100 nCi/g was not addressed with respect to management practice, storage volume, to-be-generated volume, etc. within the AKS. When questioned about the use of load management, the AKE stated during the audit that load management was not considered as an option at this time. If this practice, however, will be implemented, the AKS must then be revised prior to implementation of load management to include this waste population and the requisite information pertinent to this population.

AK data discrepancies and data limitations were addressed.

The CCP procedure CCP-TP-005 required documentation of AK-AK data discrepancies, as well as discrepancies between AK-characterization data. During the inspection, EPA examined the Discrepancy Reports DR002, Discrepancy Resolution, Radiological Characterization for ^{238}U in TA-50 wastewaters (assuming that quantity of ^{238}U is equal to ^{235}U), and DR001 Discrepancy Resolution, Waste Stream LA-MIN03-NC, 4/16/04. While the discrepancy reports were prepared, the CCP conservatively assumed that ^{238}U equaled the amount of ^{235}U present in sludges because the AKE didn't have enough information to more precisely assess the ^{238}U content. Also, the AKE noted that there are several disparate and confusing sources for radiological information pertinent to these sludges, although great effort was made to decipher the information assembled. EPA agrees that the sources identified by DOE show confusing and at times disparate information. We also concur that although average isotopic distribution for wastewater treatment sludges was provided, use of these distributions on a drum-by-drum basis is not appropriate at this time. Should analytical data obtained in the future support the use of the AK distributions presented in the AKS, the site may reconsider the use of these data, provided that all information supporting the determination are in the record, and the AK Memo (see 3, below) is revised.

New procedural requirements have been implemented to mandate AK-NDA communication.

CCP added Section 4.4.17 to CCP-TP-005 addressing the need for NDA-AK personnel communication, and a memorandum was prepared documenting communication achieved thus far. Such communication is necessary with respect to the assignment of isotopic ratios on a container basis with respect to wastewater treatment sludge waste stream. AK personnel stated that the presence of the extensive number of waste types in the sludge waste stream has resulted in significant variability in isotopic composition on a container basis. The AKE indicated that the AKS did not justify the use of waste stream averaged isotopic ratios on a container basis, and information in the AKS should not be used for assigning default isotopic ratios to individual containers. However, NDA personnel initially disregarded the AKE conclusion. Prior to the inspection, when Multi-Group Analysis (MGA) failed to provide a measurement of the plutonium isotopic ratios, the NDA personnel erroneously applied a set of declared isotopic ratios based on Material Type 52 (MT52) in NDA 2000 software.

During the inspection, this issue was brought to the forefront, and site representatives worked during the audit time frame to address the issue. The AKE and NDA personnel agreed to the following:

> "If default isotopic ratios are unavailable through AK, only radionuclides that are directly measured will be reported in accordance with DOE/WIPP-02-3122, Section 3.3.1. If the activity of a radionuclide is below the lower limit of detection [LLD] and is one of the ten WAC target nuclides, it will be reported as "<LLD" for activity and uncertainty. If the activity of a radionuclide is below the lower limit of detection and is not one of the 10 WAC target radionuclides, it will be reported as "0."

The AKE also indicated that they will add a statement that default isotopic ratios are unavailable through AK, and a separate page with joint signatures by the AKE and NDA Expert to show joint concurrence with how AK will be used by NDA. Following the inspection, a revised memorandum was provided to EPA that included the discussed revisions. The revised memorandum appeared to adequately address the AK-NDA communication issues identified during the inspection. NDA and AK personnel should be aware of the requirements of Section 3.3.1 of the WAC. This section described the assignment of LLD vs 0 by whether the radionuclide is expected vs. unexpected, but did not specifically address non-WIPP-tracked radionuclides. Therefore, LANL CCP must ensure that the assignment of LLD vs 0 for the non-EPA, but expected, isotopes is consistent with requirements and practice.

The AK Summaries should better address and justify waste stream determinations.

The WAP and WAC defined waste stream as:

> "A waste stream is waste material generated from a single process or from an activity which is similar in material, physical form, and hazardous constituents."

The AKS for both the debris and sludge should clearly indicate how the waste streams met the required definition. This is of particular importance for the TA-55 non-hazardous debris waste because previously distinct waste streams were merged to create this category. This waste resulted from the weapons grade ^{239}Pu production process, and the generation of a distinct isotopic signature as a "similar" material supported this claim. Similarly, the determination of a non-hazardous designation was supported due to the different waste streams contained similar hazardous constituents. It was unclear, however, whether the "similar physical form" distinction had been met. All waste stream designations should be well supported, including the fact that the site was taking advantage of the similar waste material requirements through identification of a distinct isotopic signature.

Waste Matrix Code (WMC) assignments should be better justified

An S5400 designation has been applied to the non-hazardous TA-55 Debris waste stream, and the containers from this waste stream were drawn from previously identified waste streams NHD01 and NCD01. The WAP requires assignment of a WMC, but S5400 is a broader WMC Group. AK personnel indicated that assignment of a detailed WMC is not justified by the quality of AK data, in that significant variability is expected, but the AKE were not able to indicate whether this complexity is inherent or was imparted by the waste stream combination process. Also, available drum-specific AK data could allow the assignment of a WMC, but AK personnel did not do so, again, because they believed that the data were inherently problematic. If the current waste stream designation is retained, the AKS should be revised to clearly support and justify why a WMC cannot be determined even if such a determination can be made on a drum level. Further, the AK Accuracy calculation is required on a WMC, not on a WMC-group basis, so this decision would render the AK Accuracy calculations invalid.

Procedural modifications have been made to address the expansion and addition of containers to existing waste streams.

CCP added a new section 4.9 to CCP-TP-005 that proceduralized the addition of newly-identified waste drums to existing waste streams. Section 4.9.4 stated that existing waste streams can be revised to include new drums, but did not reference or establish reporting requirements for waste stream profile form (WSPF) modifications, etc. that could be required if this addition modified volumes, dates of waste generation, isotopic information, etc. CCP-TP-005 should be revised to include this information or reference where these WSPF change triggers are addressed in other procedures.

The CBFO audit appropriately addressed issues dealing with misidentification of summary waste category groups using RTR, identification of "out of waste stream" items, project level validation/verification, and BDRs which are examined for the AK traceability analysis.

CBFO issued three Corrective Action Reports (CARs A, B, and C) dealing with misidentification of summary waste category groups using RTR, identification of "out of waste stream" items, project level validation/verification (V&V), and completeness of BDRs, which were examined for the AK traceability analysis. While these CARs were issued in the areas of RTR, Data V&V, and quality assurance (QA), elements of these technical issues relate to AK in that identification of waste matrix codes/summary waste category groups and resolution of AK-RTR discrepancies is an AK concern, as is miscategorization in inappropriate waste streams. EPA expects CBFO to provide CAR resolution documentation prior to the next EPA inspection as part of our pre-audit examination process.

EPA concluded that the use of AK to characterize CH retrievably-stored TRU debris (S5000) and solid (S3000) waste was adequately demonstrated.

Findings

The EPA inspection team identified no AK findings.

Concerns

The EPA inspection team identified four AK concerns:

AK Concern Number 1: Additional information should be included in the AKS Report, and the reports should demonstrate accurate interpretation of data presented. The following are specific examples pertinent to wastewater treatment sludges:

- Waste volume totals by year to understand how volume/input changes did occur during the waste stream generation period;
- Discussion of the waste by nuclide content (current mixed; this approach could help clarify input/time);
- To enhance readability, include section with header addressing data discrepancy or data interpretation challenges; and
- Provide a concluding statement regarding the use of AK data for determining specific isotopic ratios/distribution on a drum basis (for use in NDA).

No response to this concern is required at this time. EPA will evaluate AKS with respect to resolution of these concerns during our recertification inspection.

AK Concern Number 2: CCP-TP-005 was revised to include a new section 4.4.17 mandating AK-NDA personnel communication and concurrence with regard to the use of AK by NDA. The following language was added to a memorandum discussing the use of AK with respect to NDA:

> "If default isotopic ratios are unavailable through AK, only radionuclides that are directly measured will be reported in accordance with DOE/WIPP-02-3122, Section 3.3.1. If the activity of a radionuclide is below the lower limit of detection and is one of the ten WAC target nuclides, it will be reported as "<LLD" for activity and uncertainty. If the activity of a radionuclide is below the lower limit of detection and is not one of the 10 WAC target radionuclides, it will be reported as "0."

The AKEs also indicated that they will add a statement that default isotopic ratios were unavailable through AK, and a separate page with joint signatures by the AKE and NDA Experts to show joint concurrence with how AK will be used by NDA. No response to this concern is required, and EPA shall assess the adequacy of waste stream AK-NDA resolution memorandum during our recertification inspection.

AK Concern Number 3: The WAP and WAC define waste stream as:

> "A waste stream is waste material generated from a single process or from an activity which is similar in material, physical form, and hazardous constituents."

The AKS for both the debris and sludge should clearly indicate how the waste streams meet the required definition. This is of particular interest for the TA-55 non hazardous debris waste assessed during the inspection because previously distinct waste streams were apparently merged to create it. Consistent with RFETS' waste identification procedure, the waste is the result of the weapons grade ^{239}Pu production process, and the generation of a distinct isotopic signature as a "similar" material supports this. Similarly, the determination of a non-hazardous designation groups the waste by similar hazardous constituents. It is difficult, however, to determine whether the "similar physical form" distinction has been met. All waste stream designations should be well supported, including the fact that the site is taking advantage of the similar waste material requirements through identification of a distinct isotopic signature.

No response to this concern is required at this time. EPA will evaluate whether waste stream discussions in AKS were revised to more adequately define waste streams during our recertification inspection.

AK Concern Number 4: An S5400 designation had been applied to the non hazardous TA-55 debris waste stream and the containers from this waste stream were drawn from previously identified waste streams NHD01 and NCD01. The WAP requires assignment of a WMC, but S5400 is a broader WMC Group, not a WMC. AK personnel indicated that assignment of a detailed WMC was not justified by the quality of AK data, in that significant variability is expected, but they were not able to explain whether this complexity is inherent or was imparted by the waste stream combination process. Also, drum-specific AK data were available which allowed the assignment of a WMC, but AK personnel did not do so, again, because they believed that the data were inherently problematic. If the current waste stream designation is retained, the AKS should be revised to clearly support and justify why a WMC code cannot be determined even if such a determination can be made on a drum level. Further, the AK Accuracy calculation is required by a WMC, not WMC group basis, so this decision would render the AK Accuracy calculations invalid.

No response to this concern is required at this time. EPA will evaluate whether the waste matrix code assignment is adequately justified and whether appropriate recognition of subsequent AK accuracy implications are adequately addressed during our recertification inspection.

7.2 Non Destructive Assay (NDA)

EPA inspected two NDA systems to be used as part of the CCP at LANL. As part of the inspection, EPA reviewed the following elements of the NDA process:

Capability of the measurement hardware and software to perform the required analyses,

Technical adequacy of the NDA documents and procedures, and

Knowledge and understanding of the personnel involved in the NDA program.

The checklists in Attachments A.2 and A.3 identify the objective evidence that we examined for the Mobile Characterization Services (MCS) HENC#1 and the PTGS, respectively. The following documents were among those examined to assess whether NDA was being adequately performed:

- CCP-PO-002, CCP Waste Certification Plan, Revision 9, 03/15/04
- CCP-TP-063, CCP Operating the High Efficiency Neutron Counter Using NDA 2000, Revision 3, 04/21/04
- CCP-TP-064, CCP Calibrating the High Efficiency Neutron Counter Using NDA 2000, Revision 1, 03/24/04
- CCP-TP-103, CCP Data Reviewing, Validating and Reporting Procedure for the High Efficiency Neutron Counter Using NDA 2000, Revision 2, 04/21/04
- CCP-TP-123, CCP Calibrating the Tomographic Gamma Scanning System, Revision 0, 03/26/04
- CCP-TP-124, CCP Determining Isotopic Ratios in Waste Containers Using the PC/FRAM Assay System, Revision 0, 03/26/04
- CCP-TP-125, Verification and Validation of FRAM and PTGS Nondestuctive Assay Data Using a Manual Review Method, Revision 1, 04/16/04
- CCP-TP-126, CCP Waste Assay Using the Portable Tomographic Gamma Scanner, Revision 0, 03/26/04
- MCS-HENC1-NDA-1001, Calibration Report for the MCS HENC#1 Including Passive Neutron Calibration Verification and Gamma Spectrometer Calibration and Conformation, Revision 2, 04/28/04
- CI-HENC-TMU-101, Total Measurement Uncertainty for the MCS HENC#1 With Integral Gamma Spectrometer, Revision 2, 04/28/04
- RRES-CH:03-023, Calibration and Confirmation Plan for the Portable Tomographic Gamma Scanner, 11/06/03
- RRES-CH:04-005, Portable TGS Mass Calibration and Calibration Confirmation for Pu-239, 01/07/04
- TWCP-09491, Method for Computing Total Measurement Uncertainty for the Portable TGS System, 08/29/02
- Batch Data Report LANDA0003
- Batch Data Report LANDA0004
- Batch Data Report LANDA0005
- NCR-LANL-0102-04
- NCR-LANL-0104-04
- Batch Data Report LA04-PTGS-001
- Batch Data Report LA04-PTGS-003
- NCR-LANL-0204-04

- NCR-LANL-0305-04

During the inspection, we assessed several technical elements of CCP's NDA process at LANL (see Attachment A.2), as discussed below.

The design of the Mobile Characterization Services High Efficiency Neutron Counter was assessed.

The MCS HENC#1, located on Pad 10 in Area G of TA-54, was a combination (or hybrid) NDA system incorporating both a passive neutron counter and an integral gamma-ray spectrometer. The passive neutron counter used ^{3}He proportional counters, along with a multiplicity shift register and an Add-a-Source (AaS) matrix correction, to provide an estimate of the amount of spontaneously fissioning material inside the drum. This quantity, referred to as the ^{240}Pu effective, was the amount of ^{240}Pu that would produce the observed true coincidence rate, after correcting for the neutron moderation properties of the waste matrix. The quantity of individual radionuclide could be related to the ^{240}Pu effective if the relative ratios of the quantities of the radionuclides, including all spontaneously fissioning radionuclides, was measured or otherwise known. In the MCS HENC#1, these radionuclide (or isotopic) ratios were normally determined by Multi-Group Analysis (MGA) of the gamma-ray spectrum, measured by the integral gamma-ray spectrometer, described in following paragraph.

The integral gamma-ray spectrometer was a high purity germanium (HPGe) detector used to acquire the gamma-ray spectrum to be analyzed by MGA, and to provide direct quantification of a number of radionuclides, including ^{238}Pu, ^{239}Pu, ^{241}Pu, ^{241}Am, ^{233}U, ^{235}U, ^{238}U, ^{137}Cs, and ^{237}Np. The spectrometer used a multi-curve efficiency calibration, based on the density of the waste matrix, to correct for the attenuation of gamma-rays inside the drum.

System calibration of the MCS HENC#1 had been performed as required.

The calibration of the MCS HENC#1 was documented in *Calibration Report for the MCS HENC#1 Including Passive Neutron Calibration Verification and Gamma Spectrometer Calibration and Confirmation*, MCS-HENC1-NDA-1001, Revision 2, dated April 28, 2004. The calibration was applicable to S3000 homogenous solid wastes and S5000 debris wastes packaged in 55-gallon drums, with or without polyethylene liners. The passive neutron calibration, performed originally in November 1997 was verified in March 2004 using combinations of weapons grade plutonium (WGPu) sources totaling 0.50, 3.0, and 160 grams in a non-interfering matrix. The calibration range of the passive neutron system was 0 to 100g WGPu for both solid and debris waste.

The integral gamma-ray spectrometer was calibrated in March 2004 using six (6) $^{241}Am/^{152}Eu$ line sources in five (5) surrogate waste drums with waste matrix densities of 0.018, 0.49, 0.69, 1.24, and 1.64 g/cm^3. For each of the surrogate waste drums, the efficiency of the detector was measured as a function of gamma-ray energy between 59 and 1,408 kiloelectron-volts (keV). The calibration of the integral gamma-ray spectrometer was confirmed using the same WGPu sources used to verify the passive neutron calibration.

The total measurement uncertainty (TMU) of assays performed on the MCS HENC#1 had been determined and documented.

The determination of the TMU of assays performed on the MCS HENC#1 is documented in *Total Measurement Uncertainty for the MCS HENC#1 With Integral Gamma Spectrometer*, CI-HENC-TMU-101, Revision 2, dated April 28, 2004. Among the components of uncertainty included in the TMU determination for the passive neutron measurement were contributions from the calibration uncertainty, calibration counting statistics, matrix and source distribution effects, background effects for high Z waste matrices, and uncertainties due to isotopics, chemical forms, and neutron multiplication.

For the integral gamma-ray spectrometer, components of uncertainty included in the TMU determination were: counting statistics, background fluctuations, interferences from other gamma-emitting radionuclides, calibration uncertainties, matrix non-homogeneities, non-uniform source distributions, isotopic measurement uncertainties, and effects from self-absorption.

The lower limits of detection (LLD), including the minimum detectable concentration (MDC) of the MCS HENC#1, had been determined and documented.

The LLD was defined in the *CCP Transuranic Waste Certification Plan*, CCP-PO-002, Revision 9, dated March 15, 2004, as "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 LLD of any given NDA measurement is likely to depend on the type of measurement (that is, passive neutron vs. gamma spectrometry), the properties of the waste matrix being assayed, and the environmental background. For this reason, the LLD would vary from drum to drum and may even vary between measurements of the same drum. The NDA2000 software estimated and reported the LLD of each of the ten (10) WIPP-tracked radionuclides for each measurement. Only measured values that exceeded the reported LLD for that measurement were to be reported and were used in calculations of derived quantities, such as total TRU alpha activity and TRU alpha activity concentration. The average LLD for each of the WIPP-tracked radionuclides estimated for two surrogate drums containing 38.3 kg of debris waste and 227 kg of homogenous waste was included in *Calibration Report for the MCS HENC#1 Including Passive Neutron Calibration Verification and Gamma*

Spectrometer Calibration and Confirmation, MCS-HENC1-NDA-1001, Revision 2, dated April 28, 2004. These values were typical of the waste drums to be assayed on the MCS HENC#1.

EPA replicate testing of the MCS HENC#1 was performed and evaluated.

The purpose of the replicate testing performed as part of this inspection was to provide the EPA with an independent means to verify that the MCS HENC#1 could provide consistent, reproducible results for the determination of the quantity of ten 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 TRU alpha concentration. This was accomplished by reassaying drums previously characterized on the same system or instrument in order to:

- show that the instrument produces 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; and
- show that the instrument provides reproducible results over longer periods of time, such as weeks or months, by comparing the results of the replicate measurement(s) to the original reported values.

As part of the inspection to certify the MCS HENC#1, EPA requested that LANL reassay two (2) drums that EPA randomly selected from a list of drums previously assayed on the HENC. The drums included containers LAS850170, and LA00000059032. Each of the drums was reassayed five (5) times. Two statistical tests, a chi squared (χ^2) test and t test were performed for each container. Data and results of the statistical analysis are included in Attachments B.1-B.4.

For Container LAS850170, the *t* test showed only statistically significant differences between the original measurement assay values and the average of the five replicate measurements for the activities of ^{241}Am and ^{237}Np. The averages of the assay values for ^{241}Am and ^{242}Np are only 13% greater and 9% less than the original assay values, respectively. The failure of the *t* Test is due primarily to the very small relative sample standard deviation in the replicate measurements: 0.7% and 1.4% for ^{241}Am and ^{237}Np, respectively. The χ^2 test for the same container showed that, within the statistical limits of the test, the observed variances in the replicate measurements were less than or equal to the reported uncertainties for all values.

The t test for Container LA00000059032 showed only statistically significant differences between the original measurement assay values and the average of the five replicate measurements for the activities of ^{137}Cs and ^{90}Sr. The averages of the assay values for ^{137}Cs and ^{90}Sr are only 14% less than the original assay values, a difference not inconsistent with the reported uncertainty and quite likely due simply to chance. The χ^2 for the same container showed that, within the statistical limits of the test, the observed variances in the replicate measurements are less than or equal to the reported uncertainties.

The design of the PTGS was assessed.

The PTGS, located in Building B54-438 on Pad G in TA-54 was an automated NDA system designed to quantify the amount of ^{239}Pu in a 55-gallon waste drum. The PTGS used a single high purity germanium (HPGe) detector to detect gamma-rays emitted by ^{239}Pu. A tungsten shield and collimator limits the detector view and provides shielding. In addition to measuring the emission rate of ^{239}Pu, the HPGe detector also measured the attenuation of gamma-rays emitted by a ^{75}Se transmission source, located on the opposite side of the drum from the detector. Detector signals were processed by an EG&G DSPEC^{TM} signal processor, while the assay was controlled by ANTECH's MasterScan software package. The PTGS used a ^{109}Cd source to correct for the deadtime of the system. During the assay, the drum was rotated and translated vertically and horizontally. By viewing the drum from many positions, the ^{239}Pu emission and matrix attenuation properties, could be calculated for each volume element (voxel) of the drum. Each voxel was approximately the size of cube 2 inches × 2 inches × 2 inches (5 cm × 5 cm × 5 cm). By summing the quantity of ^{239}Pu in each voxel, the total quantity of ^{239}Pu in the drum could be calculated.

A second HPGe detector system, located in Building B54-439 on Pad G in TA-54 measured the ratios of quantities of gamma-ray emitting radionuclides to ^{239}Pu using Fixed-Energy Response Function Analysis with Multiple Efficiencies (FRAM). By combining the radionuclide (or isotopic) data from the FRAM system with the total quantity of ^{239}Pu determined by the PTGS, the total quantity of individual radionuclides could be estimated as well as other derived quantities, such as the total TRU alpha activity and TRU alpha activity concentration.

System calibration of the PTGS had been performed as required.

The calibration of the PTGS was documented in *Portable TGS Mass Calibration and Calibration Confirmation for Pu-239*, RRES-CH-04-005, dated January 7, 2004. The PTGS was calibrated in December 2003. The calibration was applicable for S5000 debris wastes packaged in 55-gallon drums with mass loading between 0.565 g ^{239}Pu (0.6 g WGPu) and 177 g ^{239}Pu (189 g WGPu). The calibration was confirmed by assaying combinations of weapons-grade plutonium sources totaling 1.6, 9, and 160 g in a non-interfering matrix.

The TMU of assays performed on the PTGS had been determined and documented.

The determination of the TMU for the PTGS was documented in *Method for Computing Total Measurement Uncertainty for the Portable TGS System, TWCP-0949 dated August 29,* 2002. The TMU determination included contributions from self-shielding (lumps of plutonium), source position/distribution, matrix properties, and system calibration. These components, when combined were referred to as the system uncertainty. The system uncertainty, estimated to be 11.7%, was combined with uncertainties from counting statistics and the FRAM isotopic analysis, and was determined for each individual assay to determine the TMU of the reported values.

The LLD including the MDC of the PTGS had been determined and documented.

The LLD, as defined in the *CCP Transuranic Waste Certification Plan*, CCP-PO-002, Revision 9, dated March 15, 2004, was "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 LLD of any given NDA measurement was likely to depend on both the properties of the waste matrix being assayed, and the environmental background. For this reason, the LLD would vary from drum to drum and may even vary between measurements of the same drum. The determination of the LLD of the PTGS had been documented in *Lower Limit of Detection for LANL TRU Waste Program's NDA Systems*, TWCP-10177, dated October 15, 2002. Although the LLD was not determined for each assay, the LLD estimated for a typical measurement was significantly less than the lower end of the PTGS operating range. Additionally, the LLD of any assay below 2 g ^{239}Pu was evaluated as part of independent technical review to ensure that any reported value was above the LLD.

EPA replicate testing of the PTGS was performed and evaluated.

The purpose of the replicate testing performed as part of this inspection was to provide the EPA with an independent means to verify that the PTGS can provide consistent, reproducible results for the determination of the quantity of ten 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 TRU alpha concentration.

As part of the inspection to certify the PTGS, EPA requested that LANL reassay Drum LA00000059062, a drum that EPA randomly selected from a list of drums previously assayed on the PTGS. The drum was reassayed five (5) times. Two statistical tests, a chi squared (χ^2) test and t test were performed. Data and results of the statistical analysis are included in Attachments B.5-B.6.

The *t* test for Drum LA00000059062 showed no statistically significant differences between the original measurement assay values and the average of the five replicate measurements. The χ^2 for the same container showed that, within the statistical limits of the test, the observed variances in the replicate measurements are less than or equal to the reported uncertainties.

Findings:

The EPA inspection team identified no NDA findings.

Concerns:

The EPA inspection team identified no NDA concerns.

7.3 Real-Time Radiography (RTR)

Real-Time Radiography (RTR) of both debris and sludge drums was observed by the inspection team on April 27 and 28, 2004. The purpose of NDE was to perform an X-Ray scan of each CH TRU waste drum being processed for shipment to WIPP. This scan was performed primarily to quantify waste material parameter such as cellulosics, plastics, and rubbers (CPR), ferrous and non-ferrous metals, and detect prohibited items. Prohibited items were scanned and documented for subsequent removal during VE before a drum was to be certified for shipment.

As part of the inspection of the RTR activities, the team reviewed the elements of the RTR process listed below. Emphasis was placed on overall procedural technical sufficiency and scope and on quantitative and qualitative identification of waste material parameters. Quantification of WMPs was required according to 40 CFR 194.24:

- Documentation of RTR activities through procedures, operating instructions, and operator aids;
- Proper execution of RTR activities;
- Management oversight and independent review of RTR activities;
- Statistical verification of RTR activities through VE (see Section 7.4); and
- Training of RTR personnel.

The following documents were among those examined to assess whether all RTR operations follow the appropriate approved procedures:

- CCP-QP-008-A4, Rev 0, 8/27/03 "CCP NDE BDR TOC"
- CCP-TP-002-A8, Rev 1, "CCP RTR VE Summary of Prohibited Items & AK"
- CCP-TP-003-A14, Rev 0, "CCP Miscertification Rate Calculations"
- CCP-TP-011-Appendicies 1-8, Rev1 "CCP Radiography Data Sheet", "Radiography ITR Checklist", "Radiography Technical Supervisor Checklist", "Radiography FQAO Checklist", "Radiography BDR Cover Sheet", "Radiography BDR Cover Sheet", "Radiography Measurement Control Report", "Radiography Batch Narrative", and "RTR Batch Weight Record"
- CCP-TP-011, Rev15, "CCP Radiography Inspection Operating Procedure"
- CCP-TP-028, Rev 2, "CCP Radiographic Test & Training Drum Requirements"
- CCP-TP-045, Rev 7, "RTR Radiography Inspection Operating Procedure"
- CCP-TP-053, Rev 1, "CCP Standard RTR Inspection Procedure"
- CCP-TP-099-Appendicies 1-9, Rev 0, "Radiography Data Sheet"; "Radiography ITR Checklist"; "Radiography Technical Supervisor Checklist"; "Radiography FQAO Checklist"; "Radiography Batch Data Report Cover Sheet"; "Radiography Measurement

Control Report"; and "Radiography Batch Narrative"

- CCP-TP-099, Rev 0, "RTR #4 Radiography Inspection Operating Procedure"
- CCP-TP-102, Rev 1, "RTR #2 Radiography Inspection Operating Procedure"
- CCP-TP-121, Rev 0, "CCP RTR #1 Operating Procedure"
- CCP-TP-122, Rev 0, "CCP RTR #2 Operating Procedure"
- Training Records for RTR Operations Staff

During the inspection, we assessed several technical elements of CCP's RTR process at LANL (see Attachment A.3), as discussed below.

RTR operation was observed.

RTR operator Mr. Leon Martinez demonstrated the examination of drums #59062, 59064, & 59414 on the RTR #2 on April 27, 2004. The RTR operations lead was also present to assist and answer questions. EPA reviewed the "CCP Scale Check and Container Weight Information Form" to verify proper calibration and instrument set-up. Daily calibration of instrumentation and a test pattern were completed. During the RTR activity, Mr. Martinez observed the following items in drum #59062: liners which were tied, twisted and taped into horsetails; Tygon tubing; scrap metal; fasteners; a "blade holder;" bearings; open plastic bottles; a paint brush; a HEPA filter casing; wire; and gasket material. Mr. Martinez also noted that the drum contained a heterogeneous debris waste, and that there were no liquids or other prohibited items in the drum.

The waste stream profile, hazardous waste codes, and weight were checked by the RTR operator. The following information for drum #59062 was recorded:

Waste Batch #: LA-RTR2-04-002

Waste Matrix Code: S5300

Additionally, Mr. Leon Martinez demonstrated the use of the RTR #1 by examining drum #S817161. The RTR operations lead was also present to assist and answer questions. During the RTR activity, Mr. Martinez observed that: there was a homogenous organic sludge in the drum; that the drum had a liner; that the liner was punctured; and that there was no free liquid apparent between the sludge and the drum edge.

A test drum videotape and DVD were examined.

Videotape of the test drum (LANL-NDE-TEST-001 for both Paul and Leon Martinez) and of a sample of actual RTR drum observations (drums S850170, 174, 176, 360, 473, 477 and 595, 59314, 59372 and 59404) was reviewed. The video tapes included an audible description and were found complete and accurate. The drum #10000630 was selected for reviewing the RTR tape. The material present included cement-like material, insulation, and filter media. No prohibited items were noted and the IDC code was confirmed.

A DVD recording of RTR on drum #59064 was reviewed. EPA noted that a test pattern was not recorded on the DVD as required by procedure. The RTR operators were able to determine that the test pattern had been performed and recorded on the RTR systems hard drive. A new DVD was created and this issue was considered closed.

Batch data reports and training files were examined.

EPA reviewed every batch data report that had been generated by the LANL CCP program prior to the audit. The following are the batch data reports and a sampling of the drum numbers reviewed:

Batch #	Drum #'s
LA-RTR1-04-001	
LA-RTR1-04-002	S850143, 162, 163, 170, 174, 176, , 201, & 252
LA-RTR1-04-003	S850360, 473, 477, & 595
LA-RTR1-04-004	LA00000059314, 372, & 404
LA-RTR2-04-001	
LA-RTR2-04-002	S870350, 387, 642, & 643
LA-RTR2-04-003	S59049, 62, 64, 67, & 70

EPA noticed that, on a number of drums, NCR's were issued because all layers of confinement were not vented. In all cases, however, the operator checked the box on the review form indicating that this was not a recurring issue. EPA made further inquiries and discovered that approximately 75% of the drums had this type of NCR issued and EPA concluded that the RTR operator/reviewer's assessment that this was not a reoccurring issue is erroneous. EPA has documented this issue as *RTR Concern #1* because a failure to recognize recurring issues through the NCR process could lead to potentially significant problem. No response to this concern is required. EPA will assess whether the nonconformance reports (NCRs) are being appropriately written during the recertification inspection.

EPA examined the training files for RTR operators Paul Martinez and Leon Martinez. Included in the files were Qualification Packages for RTR, Written Test and Training Examination Results, Supplemental Qualification Packages for RTR, Training Equivalency Form (as appropriate) Employee Qualification and Certification lists, Employee Training History, and Test Drum Evaluation.

Findings:

The EPA inspection team identified no RTR findings.

Concerns:

RTR Concern Number 1: Approximately 75% of RTR drums had an NCR issued because of a failure of the vent to penetrate all layers of confinement. These vents were installed prior to the EPA's WIPP Compliance Decision and the vent failure is corrected during VE of the drums. The RTR operators did not view this as a recurring issue in the review process. The failure to recognize a recurring issue as part of the RTR review process could lead to potentially significant issues. No response is required to this concern. At the next inspection, EPA will verify steps taken to address this concern.

7.4 Visual Examination (VE)

VE is used to determine the type and amounts of each waste material parameter and ascertain the presence or absence of items prohibited from disposal in the WIPP. Objective evidence is documented in the checklists included as Attachment A.4. VE could be used as the primary non-destructive examination process, and was also used to confirm radiography and develop miscertification rates. VE operations were inspected on April 28 and 29, 2004.

As part of the inspection of the VE activities, the team reviewed the elements of the VE process listed below. Emphasis was placed on overall procedural technical sufficiency and scope and on quantitative and qualitative identification of WMPs:

Characterization of waste material parameters as required by 40 CFR 194.24,

Documentation of VE activities,

Adequate documentation of VE procedures, and

Training of VE personnel.

The following documents were among those examined to assess whether all VE operations follow the appropriate approved procedures:

CCP-QP-008-A5, Rev 0, "CCP VE BDR TOC";

CCP-TP-001-A2, Rev 1, "CCP SPQAO VE Project Level Validation Checklist & Summary";

CCP-TP-002-A8, Rev1, "CCP RTR VE Summary of Prohibited Items & AK Confirmation";

CCP-TP-013, Rev 13, "Waste Visual Examination and Repackaging";

CCP-TP-041, Rev 10, "Prep & Handling Waste Drums for VE;

CCP-TP-062, Rev 10, "TRU Waste Visual Examination Segregation Repackaging";

CCP-TP-084, Rev 0, "CCP Removal of Prohibited Items within TRU VE Facility";

CCP-TP-085, Rev 1, "CCP TRU VE Facility Operations";

CCP-TP-088 Appendices 1-6, Rev 0, "VE Batch Data Report Cover Sheet"; "VE BDR Table of Contents"; "VE Batch Narrative Form"; "VE Generation Level ITR Checklist"; "VE Data Generation Level Technical Supervisor Checklist"; and "VE Data Generation Level FQAO Checklist";

CCP-TP-088, Rev 1 "CCP Program Data Generation Level Review for VE";

CCP-TP-113 Rev 1, "Standard Waste Visual Examination";

CCP-TP-114 Appendices 1-9, Rev 0, "CCP Waste VE BDR Cover Sheet"; "Waste VE BDR TOC"; "VE Measurement Control Report for Debris";" VE Measurement Control for Homogeneous Waste"; "VE Data Form"; "VE Prohibited Item Removal"; "VE ITR Checklist"; "VE Technical Supervisor Checklist"; and "VE FQAO Checklist";

CCP-TP-114, Rev 2, "CCP Waste VE"; and

Training Records for VE operations staff.

During the inspection, we assessed several technical elements of CCP's VE process at LANL (see Attachment A.4), as discussed below.

The VE process for debris waste was observed.

The VE processes were observed in TA-50 on April 28, 2004 for "Debris" Waste and in TA-54, Area G on April 29, 2004 for "Solid" Waste. The VE operators positioned and opened "debris" drum #59399. Prior to beginning any VE activity, the operator at the console performed an Audio/Visual check including camera pan and tilts as well as zoom function. Next a scale calibration verification (Scale ID #06193236MD with calibration due 8/11/04) and daily weight standards checks were performed. Scale units were verified and VE operations commenced. Each item was removed from the drum, identified, and placed in to the approximately 1 cubic foot scale hopper. Items of the same waste material parameter were removed until the scale hopper was filled at which point a scale reading was recorded. Not only was an A/V record of the evolution captured on videotape, but also a written record by the operator at the console. The parent drum was entirely emptied with the contents fully emplaced in a single daughter drum. This is the case in most visual examinations and for that reason; daughter drums typically have the same drum ID as the parent drum. The parent drum is cleared and disposed of following VE.

The VE operator explained on the tape the types of liners within the drum, a Type 3, 90-mil liner. The drum weighed 60.5 kg gross and was estimated to be 100% full. The DOE/CCP requirement for "Fill Factor" (referred to as Volume Utilization Percentage (VUP) at LANL) was that the container "Fill Factor" be estimated based on the height at the "top of the waste." In this case, LANL/CCP VE operators correctly identified the liner as waste and estimate the "Fill Factor" based on the height of the liner (in this case 100%.) The implementation of this requirement was not explicitly prescribed by the DOE/ CCP. Operators at LANL/CCP implemented this requirement differently leading to inconsistent measurement methodologies and results. This measurement was not part of demonstrating compliance with 40 CFR 194.24 and EPA is not certain about how this number was or will be used by DOE. Therefore, EPA is issuing VE Concern #1 because the use of the data obtained by this measurement in the future could be invalid.

Batch data reports were examined.

The following "Debris" Batch Data Reports (BDRs) were for completeness, accuracy, and technical sufficiency:

LA VE 500001

LA VE 500003

LA VE 500005

No issues were identified with these BDRs.

In addition to review of BDRs, EPA reviewed videotape of previous VE activities to ensure that a broader sample of operational proficiency was reviewed than just the inspection demonstration. Videotapes for drums #59019 (batch LA VE 50 0002) and #59024 (batch LA VE 50 0004) were reviewed. Proper A/V checks, scale and weight checks, and waste removal, identification and weighing were all observed to be performed consistently and adequately.

VE of a solid waste was performed and related batch reports were examined.

On April 29, 2004, the inspection team observed the VE of "Solid" waste. After explaining the process that would take place in the contained area, the VE operators dressed out, entered, and staged the drum. The A/V record was generated by an observer outside the contained area with a video camera looking through a window. The operators within the contained area were connected via hard-wired headsets to the operator making the A/V record. Drum #S850162 was positioned and opened. The contents were confirmed to be an inorganic sludge "solid" waste with no free liquid. In the case of "solid" wastes, there is no parent or daughter drum as the material is not repackaged.

After completing observation of the VE activity in Area G, the inspection team reviewed BDRs for batch LA VE 54 0003 which included drums #S850176 and #S850201. The BDRs were found to be complete and adequate.

EPA subsequently reviewed videotape of the VE examination for batch LA VE 54 0003 which includes drums #S850176 and #S850201. The A/V record from the videotapes included the required A/V check, scale and weight confirmation, and a record of the drum opening and contents verification.

VE as confirmation of RTR was assessed.

VE was used as a confirmatory QC test following RTR. Failure of RTR to accurately characterize waste would be a reason for miscertification. Over a period of time or after completing a statistically significant number of drums, a site must determine a "mis-certification rate" specifying a number of subsequent drums which must undergo VE in order to ensure proper waste characterization. At the time of this inspection, LANL-CCP had not characterized enough drums using RTR in order to determine a miscertification rate.

VE training records were examined.

Part of the VE examination included the evaluation of training records, and a review of VE personnel. The training records included selection, training and qualification records for each of the certified VE operators, reviewers, and supervisors. The training of VE staff appeared to meet the training requirements contained in, CCP-QP-002, Rev 15, "Training & Qualification Plan."

Findings:

The EPA inspection team identified no VE findings.

Concerns:

The EPA inspection team identified one (1) VE concern:

VE Concern Number 1: LANL/CCP operators estimate the "Fill Factor" (Volume Utilization Percentage (VUP)) during container examination in both VE and RTR. The method for estimating this value is not specified in the LANL/CCP procedures. VE operators have been observed to estimate the "Fill Factor" based on the top of the drum liner while RTR operators use the top of the bulk waste material in the container. LANL/CCP should ensure that the VE and RTR operators use a consistent method to estimate the "Fill Factor." LANL/CCP should also consider using the WWIS data entry terminology, "Fill Factor" for consistency and to avoid confusion. No response is required to this concern. EPA will verify steps taken to address this concern during a future inspection.

7.5 WIPP Waste Information System (WWIS)

WC data at LANL was acquired from the various sources - AK, RTR, VE, and NDA - and subsequently compiled into BDRs. Once the waste had been through every level of review and approval, it would be certified by a Waste Certification Official (WCO) for entry into the WWIS and transmittal to the WIPP. During this inspection, EPA examined the areas of data entry and transfer.

The following documents were reviewed prior to or during the audit to inform the development of checklists and guide investigation and questions during the inspection.

- CCP-PO-002, Rev 9, "Transuranic Waste Certification Plan";
- CCP-PO-012, Rev 3, "LANL Interface Document";
- CCP-TP-103, Rev 1, "CCP Data Reviewing Validating & Reporting";
- CCP-TP-030, Rev 11, "CCP TRU Waste Certification and WWIS Data Entry"; and
- CCP-TP-002, Rev 13, "Reconciliation of DQO's & Reporting Characterization Data.

During the inspection, we assessed several technical elements of CCP's WWIS process at LANL (see Attachment A.5), as discussed below.

Performance of the data entry/transfer using the WWIS was observed.

EPA interviewed LANL/CCP staff and observed a demonstration of data entry, review, validation, and transmission in the WWIS. A comparison was made between the governing procedure requirements and the actions of the staff to ensure proper implementation. The inspection team found the procedure to be adequately implemented. The capabilities of the CCP/WWIS staff were further investigated by reviewing training documentation to ensure that staff entering and transmitting data are properly trained and qualified. EPA began by obtaining a list of all persons authorized to enter data into the WWIS. After confirming that each person on the access authorization list actually held the position and title for which they were granted access, the inspection team selected a random sample of authorized staff in order to verify their training and qualification records.

Training records for WWIS personnel were examined.

Of the twelve staff authorized to enter LANL/CCP data into the WWIS, the inspection team chose three: Connie Hernandez (WCO), Ray White (WIPP/NMSS), and Jeffery Winkel (WCO/TCO). EPA reviewed documentation of hiring and selection as well as documentation of past and current training. The training documents were found to comply with the requirements in CCP-QP-002, Rev 15, "Training & Qualification Plan." Additionally, these requirements were found to be technically sufficient to meet the waste characterization requirements.

Validation/verification of data entered into the WWIS was examined.

Data for entry into the WWIS has gone through generation level and project level validation and verification. Each drum has reported values for each of the ten WIPP-tracked radioisotopes when that radioisotope is expected to be present based on AK information. One exception to this rule is the case where the instrument reports a value less than the LLD in which case, the string "<LLD" is reported. Because the WWIS system itself is not set up to manage text strings, the string "<LLD" is represented by a value of -1. Section 7.2.1 of the WWIS manual spells out use of a value such as –1 to represent a text string.

LANL/CCP is a new site for the CCP program and therefore all of the WWIS data entry and review/approval work is done by hand. Plans were underway to develop some software aids that would ease the data entry process. This approach would be similar to that observed at other sites.

Mr. Stroble and Ms. Trujillo performed a sample data entry and transmittal evolution using the "test instance" of the WWIS for the inspection team. EPA observed adequate transmission of data and the satisfactory receipt of a confirmatory reply via email from the

WIPP.

Findings:

The EPA inspection team identified no WWIS findings.

Concerns:

The EPA inspection team identified no WWIS concerns.

8.0 RESPONSE TO COMMENTS

EPA did not receive comments in Docket A-98-49 related to this inspection.

9.0 SUMMARY OF RESULTS

The inspection team identified no findings and six concerns, none of which require a response.

Findings

None.

9.2 Concerns

AK Concern Number 1: Additional information should be included in the AKS Report, and the reports need refinement to ensure correct interpretation of data presented. The following are specific examples pertinent to wastewater treatment sludges:

- Waste volume by year to understand how volume/input changes have occurred during the waste stream generation period;
- Discussion of the waste by nuclide (current mixed; this approach could help clarify input/time) or add subsection headings to the text to clearly delineate that the individual paragraphs discuss all data from a data source;
- If it enhances readability, include section with header addressing data discrepancy or data interpretation challenges (this might help explain differing statements regarding, for example U235 based on data sources); and
- Provide a concluding statement regarding the use of AK data for determining specific isotopic ratios/distribution on a drum basis (for use in NDA).

No response to this concern is required at this time. EPA will evaluate AKS with respect to resolution of these concerns during our recertification audit.

AK Concern Number 2: CCP-TP-005 was revised to include a new section 4.4.17 mandating AK-NDA personnel communication and concurrence with regard to the use of AK by NDA. The following language was added to a memorandum discussing the use of AK with respect to NDA:

> "If default isotopic ratios are unavailable through AK, only radionuclides that are directly measured will be reported in accordance with DOE/WIPP-02-3122, Section 3.3.1. If the activity of a radionuclide is below the lower limit of detection and is one of the ten WAC target nuclides, it will be reported as "<LLD" for activity and uncertainty. If the activity of a radionuclide is below the lower limit of detection and is not one of the 10 WAC target radionuclides, it will be reported as "0."

The AKEs also indicated that they will add a statement that default isotopic ratios are unavailable through AK at this time, and to add a separate page with joint signatures by the AKE and Assay Experts to show joint concurrence with how AK will be used by NDA Following the inspection, a revised memorandum was provided which addressed EPA concerns. No response to this concern is required, and EPA shall assess the adequacy of waste stream AK-NDA resolution memorandum during our recertification inspection.

AK Concern Number 3: The WAP and WAC define waste stream as:

> "A waste stream is waste material generated from a single process or from an activity which is similar in material, physical form, and hazardous constituents."

The AKS for both the debris and sludge should clearly indicate how the waste streams meet the required definition. This is of particular interest for the TA-55 non hazardous debris waste assessed during the inspection because previously distinct waste streams were apparently merged to create it. The waste is from the weapons grade ^{239}Pu production process, and the generation of a distinct isotopic signature as a "similar" material supports this. Similarly, the determination of a non-hazardous designation groups the waste by similar hazardous constituents. It is unclear, however, whether the "similar physical form" distinction has been met. All waste stream designations should be well supported, including the fact that the site is taking advantage of the similar waste material requirements through identification of a distinct isotopic signature

No response to this concern is required at this time. EPA will evaluate whether waste stream discussions in AKS were revised to more adequately define waste streams during our recertification audit.

AK Concern Number 4: An S5400 designation has been applied to the non hazardous TA-55 debris waste stream and the containers from this waste stream were drawn from previously identified waste streams NHD01 and NCD01. The WAP requires assignment of a WMC, but S5400 is a broader WMC Group, not a WMC. AK personnel indicate that assignment of a detailed waste matrix code is not justified by the quality of AK data, in that significant variability is expected, but it is unclear whether this complexity is inherent or was imparted by the waste stream combination process. Also, drum-specific AK data are present which allow the assignment of a waste matrix code, but AK personnel did not want to do so, again, because they believe this data to have inherent problems. If the current waste stream designation is retained, the AKS should be revised to clearly support and justify why a waste matrix code cannot be determined even if such a determination can be made on a drum level. Further, the AK Accuracy calculation is required on a waste matrix code, not waste matrix code group basis, so this decision would render the AK Accuracy calculations invalid. .

No response to this concern is required at this time. EPA will evaluate whether the waste matrix code assignment is adequately justified and whether appropriate recognition of subsequent AK accuracy implications are adequately addressed during our recertification audit.

RTR Concern Number 1: Approximately 75% of RTR drums had an NCR issued because of a failure of the vent to penetrate all layers of confinement. This was not identified as a recurring issue in the review process. These vents were installed prior to the EPA's WIPP Compliance Decision and the vent failure is corrected during VE of the drums. There is no impact on WIPP performance from the vent failure, but the failure to recognize a recurring issue during the review process could lead to potentially significant issues. No response is required to this concern. EPA will verify steps taken to address this concern during the next inspection.

VE Concern Number 1: LANL/CCP operators estimate the "Fill Factor" (Volume Utilization Percentage (VUP)) during container examination in both VE and RTR. The method for estimating this value is not specified in the LANL/CCP procedures. VE operators have been observed to estimate the "Fill Factor" based on the top of the drum liner while RTR operators use the top of the bulk waste material in the container. LANL/CCP should ensure that the VE and RTR operators use a consistent method to estimate the "Fill Factor." LANL/CCP should also consider using the WWIS data entry terminology, "Fill Factor" for consistency and to avoid confusion. No response is required to this concern. EPA will verify steps taken to address this concern during the next inspection.

9.3 Conclusions

EPA's independent inspection of personnel, procedures, and equipment at LANL has led EPA to conclude that the LANL WC program meets the technical requirements of §194.24(c) regarding the WC systems and processes at LANL listed below:

Acceptable Knowledge (AK) — EPA concluded that the elements of the LANL CCP AK waste characterization processes that the inspection team examined, as identified in Attachment A.1, are technically adequate.

Nondestructive Assay (NDA) — EPA concluded that the elements of the LANL CCP NDA program examined during the inspection were technically adequate with respect to the identification of required radionuclides, instrument calibration, personnel training, and Total Measurement Uncertainty.

Radiography (RTR): — EPA concluded that the elements of the elements of the LANL CCP Radiography program that were examined during the inspection were technically adequate.

Visual Examination (VE) — EPA concluded that the elements of the LANL CCP Visual Examination program that were examined during the inspection were technically adequate.

WIPP Waste Information System (WWIS) — EPA concluded that the elements of the LANL CCP WWIS data transfer program which were examined during the audit were satisfactory.

The EPA inspection team determined that LANL-CCP's WC processes (specifically AK, NDA, RTR, VE and WWIS) inspected can adequately characterize CH retrievably stored transuranic debris (S5000) and solid (S3000) waste in accordance with 40 CFR 194.24(c)(4).

Attachments A.1 through A.5

Attachment A.1 Acceptable Knowledge (AK) Checklist

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
Procedures require staff to be: • familiar with applicable technical procedures • familiar with QAOs • qualified to assemble, compile, and confirm AK data	CCP-TP-005 Rev 13 Section 3	Employee's explanation of job duties was consistent with applicable procedures Employee could identify the mandatory AK items for assembly Employee's identification of applicable procedures was correct Employee adequately explained how to assemble, compile, and confirm data Employees responsible for AK documentation were trained and qualified in accordance with applicable procedures	Y	Training records of Mark Doherty, Kevin Peters, Steve Schafer, Randy Fitzgerald. Upon interview, all appeared knowledgable of job duties and AK requirements for data assembly, compilation, and confirmation. Examination of training records appeared to show that these people still needed to be approved for training to specific AK summaries; this occurred during the inspection.
Procedures demonstrate a logical progression from general facility information to more detailed waste stream-specific information	CCP-TP-005, Rev 13 Section 4.1-4.4	This logical sequence can be demonstrated through traceability analysis. (Traceability analysis and linkages may include but need not be limited to individual container data for radionuclides and waste material parameters, IDCs, and waste streams.) AK documentation is traceable to the drum level	Y	CCP-AK-LANL-004 Rev0; CCP-AK-005, rev 0; reference (.e.g) C014, C017, D018, D029, No26, D030, M117, C019, U002, D006/013, C033, Mo17, M012, etc; radioactive waste disposal records for drums S794294, S890306, S870645, S870643 (etc); Attachments 1 and 4 of TP-CCP-005. Data traceable from CCP listings (AK spreadsheets and status sheets) to WSPF (draft) down to drum waste disposal records.
Procedures for AK processes are consistent with each other	CCP-TP-005 Rev 13	Procedures for AK processes are implemented consistently	Y	Only one process used as described in CCP-TP-005; CCP-AK-LANL 004 and 005 examples of implementation
The site's TRU waste management program has procedures to determine: waste categorization schemes (e.g., consistent definitions of waste streams) and terminology breakdown of the types and quantities of TRU waste generated/stored at the site how waste is tracked and managed at the generator site (including historical and current operations)	CCP-TP-005, Rev 13 Section 4.1-4.4		Y, in part	CCP-AK-LANL-004 Rev0; CCP-AK-LANL-005 Rev0; tracked on LANL BDR Tracking Spreadsheet and LANL AK Tracking spreadsheet. The definition of waste stream as specified in the CHWAC/WAP should be described and compliance with this definition must be clearly demonstrated. Waste breakdowns are clear, but the site does not have a universal controlled WIPP waste tracking system that would import to WWIS, like the WEMS at RFETS or other sites

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
Procedures call for AK information to be collected for: ^{241}Am, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{233}U, ^{234}U, ^{238}U, ^{90}Sr, ^{137}Cs + unexpected radionuclides ferrous metals (in containers) cellulosics, plastics, rubber nonferrous metals (in containers)	CCP-TP-005 Rev 13	AK information is collected for: ^{241}Am, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{233}U, ^{234}U, ^{238}U, ^{90}Sr, ^{137}Cs + unexpected radionuclides ferrous metals (in containers) cellulosics, plastics, rubber nonferrous metals (in containers) Specify isotopes/quantities defined by AK • must be appropriate and result in unbiased values for cumulative activity and mass of radionuclides Is AK information collected for isotopes?	Y	CCP-AK-LANL-004 Rev0; CCP-AK-LANL-005 Rev0; C019, examples of references M001, M012 D005, P006, P012, C034, C033. The description and quantities of waste material parameters for the TA-55 debris stream is very general. Note that site AKE indicated he had no confidence in drum specific AK with respect to Waste material Code (WMC) for the TA-55 debris, so he assigned an upper lever waste matrix code group 5400 assignment, forfeiting the value of AK accuracy calculations made using the 5400 designation. The S3120 designation appears appropriate for the wastewater treatment sludges. AK radionuclide data appears to be comprehensive; site did not roll up all data into the AKS but instead prepared a detailed memo to file which includes long discussion of the radionuclide content; this is sufficient so long as the AKS is still a stand-alone document.
Procedures require documentation of radionuclide process origin	CCP-TP-005 Rev 13	Identified radionuclides and their isotopic distributions are consistent and accurate See AK Confirmation	Y	CCP-AK-LANL-004 Rev0; CCP-AK-LANL-005 Rev0; multiple source references (see checklist element above). TA-55 debris has single MT-52/12. For sludges, wet chemistry radioassay available for all drums on a batch basis since 79; did not roll 79 data up onto AK Summary, although the waste stream extends back this far (1979-87). Sludge data indicate that no single process origin can apply to this waste, and therefore no single isotopic distribution can be applied. AKE included generalized averages which showed U235, U238 and Pu239 present in most abundance over the 8 year time period, but this cannot be applied on a drum basis.
	CCR-TP-005, Section 4.4.17	Radionuclides identified by AK and isotopic distributions are provided to NDA/Radioassay personnel. If AK data are provided to NDA personnel, data are available to operators prior to determination of isotopic quantities. Data use and limitations are well defined (refer to NDA checklist).	Y, in part	AK personnel modified the CCP procedure, and have an "AK-NDA Memo" that will be at the back of Attachment 7 which documents AK-NDA communication. The current sludge memo, however, does not adequately document the use of AK with respect to AK, and this was communicated to the site; a revised memo stating that default isotopics shall not be used for sludge must be generated.

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
Procedures require: Assembling AK information Compiling AK documentation into an auditable record (the process should include review of AK information to determine the waste material parameters and radionuclides present, as well as source info discrepancy resolution) Assigning waste streams/waste matrix codes Identifying physical forms, waste material parameters, and radionuclides (including, if possible, isotopic ratios) Resolving data discrepancies Identifying management controls for discrepant items/containers/waste streams. Confirming AK information with other analytical results (done by comparing AK characterization data with that obtained through NDE and/or visual examination, including discrepancy resolution)	CCP-TP-005 Rev 13	Compilation of AK documentation is adequately demonstrated From CH WAC If AK data discrepancy is identified, site will evaluate the source of the discrepancy to determine if discrepant information is credible. Information that is not credible will be identified as such and reasons for dismissing will be justified in writing. Limitation s concerning information will be documented in the AK record and summarized in the AK report. If a discrepancy cannot be resolved, the site will perform direct measurement for the impacted population. Discrepancies are adequately resolved	Y, in part	CCP-AK-LANL-004 Rev0; CCP-AK-005, rev 0; reference (.e.g) C014, C017, D018, D029, No26, D030, M117, C019, U002, D006/013, C033, Mo17, M012, etc; radioactive waste disposal records for drums S794294, S890306, S870645, S870643 (etc); Attachments 1-11 (as applicable). LANL BDR Tracking Spreadsheet, LANL AK Tracking Spreadsheet; WSPFs for WS LA-NHD01.001 and LA-MIN03-NC-001. Example Discrepancy Reports were provided; showed U235/238 discrepancy and Hazardous waste designation discrepancy for sludge waste. Data was well assembled and compiled. However, the WMC assignment was not adequately justified. Further, while confirmation is calculated for the radionuclides, the Characterization Information Summary in the Waste Stream Profile Form (WSPF) does not include summary radionulcide data, which should be presented. Auditing example provided did not address auditing- or even AK auditing- at LANL, just a general example of a CCP internal audit. Note that the CARs issued by DOE with respect to NDE are indirectly related to the identification of prohibited items, WMC which are required elements of AK confirmation/accuracy. The AK Accuracy report provided was only a "dummy", as it did not address the apparent WMC issues identified by the CBFO auditors and expressed as CARS. Also, note that AK Accuracy is void with respect to the S5400 designation because the site simply chose not to use more specific WMC, even though they could easily be defined because they had not confidence the accuracy of the AK record with respect to physical parameters. The AK Accuracy, therefore, calculated using S5400 is meaningless and should not be construed as valid.

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
From CH-WAC 1. If AK used (i.e.data collected prior to QA program)- what method was employed to qualify-peer review, corroborating data, confirmatory testing, QA program equivalency? 2. At a minimum, to confirm existing AK data, it is necessary to compare ratios of the two most prevalent radionuclides in the isotopic mix	CCP-TP-005 Rev 13, Section 4.0 CCP-TP-005 Rev 13 Section 4	AK confirmation based on NDE and/or visual examination is adequately demonstrated 1. ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Pu, ^{242}Pu and ^{241}Am: -Confirmation can be accomplished via comparison of measured and AK values for ^{239}Pu/ ^{240}Pu for weapons grade plutonium;; ^{238}Pu/ ^{239}Pu for heat source. - Measured ^{241}Am can be used to calculate ^{241}Pu (for subsequent AK comparison) if time of chemical separation is known (no ^{241}Am at time of separation assumed) - ^{241}Pu can be compared (by ratio) to confirm AK of any Pu isotope associated with wg/rg (i.e.^{239}Pu or ^{240}Pu) - ^{238}Pu from AK for wg/rg Puis assumed to be valid if the AK values of ^{239}Pu and ^{240}Pu have been confirmed by measurement. -^{242}Pu calculated by correlation techniques since it can't be measured 2. ^{235}U, 233U, $2^{38}U$, ^{234}U - Were they tracked or measured in AK information? -If no valid AK exists, data generated can only be used to detect or calculate, or confirm absence - ratios for ^{234}U calculated from ^{235}U enrichment - if valid AK exists can confirm with certified systems -^{234}U calculated by ^{235}U enrichment because ^{234}U can't be measured 3. ^{137}Cs and ^{90}Sr -confirmed by WIPP certified system (direct measurement or comparison of ^{241}Am peak at 662 keV to other ^{241}Am peaks (disproportionate ^{241}Am peak at 662 keV could mean presence of ^{137}Cs) - ^{90}Sr calculated from ^{137}Cs using scaling factors 4. Other radionuclides- must identify via NDA and should identify via AK		CCP-AL-LANL-005, 004 Rev. 0. As indicated in the memo prepared by both the NDA and AK personnel, with respect to sludges, no default isotopics can be used; all values derived are through measurement only, except for example, for those isotopes that cannot be measured and which are calculated through correlation methods as allowed in the CH WAC. For sludges, it does not appear appropriate to assume any type of specific isotopic distribution or plutonium within the sludge at this time (weapons grade vs. head source, etc). It is similarly inappropriate to calculate ^{241}Pu from measured ^{241}Am for sludge waste, etc. For debris waste, the specific isotopic distribution for weapons grade plutonium as manufactured at TA-55 (MT-52) is justified by the AK record, and can be used by NDA personnel. MT12 is proposed for usage when uranium is detected in TA-55 debris waste; there is no information observed currently in the AK records which refutes this. The same concerns with regard to isotopic mixtures for plutonium/americium also apply to uranium for sludge debris, in that no valid AK exists at this time. For both waste streams, ^{137}Cs directly measured and ^{90}Sr calculated from Cs using a 1.1 ratio. Other radioncludes are reported if identified through measurement; AK reports show possible additional radionuclides that could be in both wastes based upon the AK record.

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
Procedures require that: AK information be compiled in an auditable record, including a road map for all applicable information. A reference list be provided that identifies documents, databases, Quality Assurance protocols, and other sources of information that support AK information. The overview of the facility and TRU waste management operations in the context of the facility's mission be correlated to specific waste stream information. Correlations between waste streams, with regard to time of generation, waste generating processes, and site-specific facilities be clearly described. For newly generated wastes, the rate and quantity of waste to be generated shall be defined. Nonconforming waste be segregated.	CCP-TP-005 Rev 13	AK information is compiled in an auditable record, including a road map for all applicable information. A reference list is provided that identifies documents, databases, Quality Assurance protocols, and other sources of information that support AK information. The overview of the facility and TRU waste management operations in the context of the facility's mission is correlated to specific waste stream information. Correlations between waste streams, with regard to time of generation, waste generating processes, and site-specific facilities are clearly described. For newly generated wastes, the rate and quantity of waste to be generated are defined. Nonconforming waste is segregated.	Y	CCP-AK-LANL-004, 005 Rev.0; CCP-TP-005, attachments 2,3,4 Both AK summaries include a document specific reference list, and the overall Attachment 4 reference list was also provided. The CBFO pointed out discrepancies wherein references on the site-specific AK Summary reference lists did not coincide with that in Attachment 4, and vice versa; this appears to be because the CCP program was under time constraints to complete AK documentation and therefore made administrative errors. Facility overview and time of waste generation were well researched. Note that for the Debris waste, the projected future waste volume was not provided in the AK Summary; this should have been included. Note that lack of a site-wide controlled database for tracking drums to WIPP complicates both the AK data assembly process and AK traceability analysis.

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
Procedures require that the following information will be included in the AK record: Map of the site that identifies the areas and facilities involved in TRU waste generation, treatment, and storage Facility mission description related to TRU waste generation and management Description of the operations that generate TRU waste at the site and process information, including: o Area(s) or building(s) from which the waste stream was or is generated o Estimated waste stream volume and time period of generation o Waste generating process description for each building or area o Process flow diagrams, if appropriate o Generalized material inputs or other information that identifies the radionuclide content of the waste stream and the physical waste form o Types and quantities of TRU waste generated, including historical generation through future projections From CH-WAC • waste identification/categorization schemes relevant to the isotopic composition of waste and description of isotopic composition of each waste stream • physical/chemical waste composition that could affect isotopic distribution (i.e. processes to remove ingrown ^{241}Am) • statement of all numerical adjustments applied to derive the material's isotopic distribution e.g. scaling factors, decay/ingrowth corrections and secular equilibrium considerations • specification of isotopic ratios for the 10 WIPP-tracked radionuclides and, if applicable, the radionuclides that comprise 95% of the hazard	CCP-TP-005 Rev 13	The following information is in the AK record: Map of the site that identifies the areas and facilities involved in TRU waste generation, treatment, and storage Facility mission description related to TRU waste generation and management Description of the operations that generate TRU waste at the site and process information, including: Area(s) or building(s) from which the waste stream was or is generated Estimated waste stream volume and time period of generation Waste generating process description for each building or area Process flow diagrams, if appropriate Generalized material inputs or other information that identifies the radionuclide content of the waste stream and the physical waste form Types and quantities of TRU waste generated, including historical generation through future projections From CH-WAC • waste identification/categorization schemes relevant to the isotopic composition of waste and description of isotopic composition of each waste stream • physical/chemical waste composition that could affect isotopic distribution (i.e. processes to remove ingrown ^{241}Am) • statement of all numerical adjustments applied to derive the material's isotopic distribution e.g. scaling factors, decay/ingrowth corrections and secular equilibrium considerations • specification of isotopic ratios for the 10 WIPP-tracked radionuclides and, if applicable, the radionuclides that comprise 95% of the hazard	Y	CCP-AK-LANL-005, 004, Rev. 0 Section 4 and 5 each document; examples of supplemental documentation examined included: sludges: C014, D018, M026, "reference 56", D030, C004, D025, C019, M018/15, debris: Reference 4 , C033, Mo17, D014, C034, D005, M009, M028. The AK Summaries appear to address CH-WAC requirements including categorization schemes relative to isotopic distribution (i.e. MT 52), physical/chemical waste characteristics, generalized numeric adjustments as applicable, etc.

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
The site has procedures for the collection of supplemental information.	CCP-TP-005 Rev 13	Samples of supplemental information are sufficiently detailed and are appropriate to the waste being characterized. From CH-WAC Examples of supplemental information include: safeguards and security and other material control systems/programs reports of nuclear safety or criticality, accidents involving SNM waste packaging, waste disposal, building or nuclear material management area logs or inventory records, site databases that provide SNM or nuclear material information test plans, research project reports, or laboratory notebooks that describe the radionuclide content of materials used in experiments, information from site personnel, and historical analytical data relevant to isotopic distribution in the waste stream	Y	CCP-AK-LANL-004 Rev0; CCP-AK-005, rev 0; reference (.e.g) C014, C017, D018, D029, No26, D030, M117, C019, U002, D006/013, C033, Mo17, M012, etc; radioactive waste disposal records for drums S794294, S890306, S870645, S870643 (etc); Attachments 1-11 (as applicable). LANL BDR Tracking Spreadsheet, LANL AK Tracking Spreadsheet; WSPFs for WS LA-NHD01.001 and LA-MIN03-NC-001. Supplemental data assembly was sufficient and much improved over CCP data assembly at the last site examined by EPA (i.e. Hanford). Supplemental information included interviews from site personnel, historic database information, building data, etc.
Site documents/procedures require the facility prepare an AK summary document that summarizes all information collected, including the basis for all waste stream designations.	CCP-TP-005 Rev 13	The AK summary is available for EPA review and contains the required information, including the basis for all waste stream designations.	Y, in part	CCP-AK-LANL-004, 005, Rev 0. AK summaries were available to EPA prior to the inspection. Note that the basis for the waste stream designation for TA-55 requires additional justification, as the overall S5400 designation is quite broad and it is unclear whether this is related to the combining of two previously distinct waste streams.
Site procedures require that additional information be collected before waste may be shipped if the required AK information is not available for a waste stream.	CCP-TP-005 Rev 13	Additional information is collected before waste may be shipped if the required AK information is not available for a waste stream.	Y	CCP-AK-LANL-004, 005, Rev 0.All required information was available.

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
The site has a written procedure for the confirmation of AK information using analytical data, including NDA/NDE and/or VE. This procedure applies to both retrievably stored and newly generated waste. This procedure requires a reevaluation of AK if NDE/NDA or VE identify it to be a different waste matrix code. This procedure describes how the waste must be reassigned, based on the AK reevaluation.	CCP-TP-005 Rev 13	AK information is confirmed using analytical data, including NDA/NDE and/or VE. Has the acceptable knowledge expert calculated the percent changes in matrix parameter categories (MPCs) based on AK and NDE/VE? Were accuracy evaluations assigned? Are these acceptable?	Y, in part	CCP-TP-005, Attachment10 and 11 The AKE does confirm AK. Note that the CIS does not include radionuclide data; also note that in the future, all AK Summaries should be updated to include confirmation results, but these should be succinctly presented so that original AK data vs. characterization data and be ascertained. Note that MPC calculations were not provided, although AK Accuracy (WMC) comparisons were made. Also note that for any waste for which detailed AK data is ignored because it is suspect and for which a higher level WMC is assigned to avoid low AK Accuracies, the resulting AK Accuracy calculations using Waste Matrix Code Group (WMCG) are not applicable.

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
Procedures require the following steps to be followed if wastes are reassigned to a different waste matrix code based on NDA/NDE or VE: Review existing information based on the container identification number and document all differences Reassess and document all analytical data associated with the waste Reevaluate waste material parameter determinations and document any changes Reevaluate the radionuclide content and document any changes Verify and document that the reassigned waste matrix code was generated within the specified time period, area and buildings, waste generating process, and that the process material inputs are consistent with the waste material parameters identified during radiography or visual examination Record all changes to acceptable knowledge records If discrepancies exist in the acceptable knowledge information for the reassigned waste matrix code, complete a nonconformance report, document the segregation of this container, and define the corrective actions necessary to fully characterize the waste	CCP-TP-005 Rev 13	The following steps are followed if wastes are reassigned to a different waste matrix code: Review existing information based on the container identification number and document all differences Reassess and document all analytical data associated with the waste Reevaluate waste material parameter determinations and document any changes Reevaluate the radionuclide content and document any changes Verify and document that the reassigned waste matrix code was generated within the specified time period, area and buildings, waste generating process, and that the process material inputs are consistent with the waste material parameters identified during radiography or visual examination Record all changes to acceptable knowledge records If discrepancies exist in the acceptable knowledge information for the reassigned waste matrix code, complete a nonconformance report, document the segregation of this container, and define the corrective actions necessary to fully characterize the waste	Y	CCP-TP-005, Attachments 10 and 11 The DOE CBFO identified several instances where the WMC assigned vs. identified on RTR did not coincide, and no NCR was written. This would appear to be an issue that might warrant reassignments of WMC, and subsequent evaluation using this bulleted checklist. Examples of Attachment 11 pertinent to this example were not provided. EPA shall assess adequacy of DOE CBFO CAR resolution by the site prior to the next audit, and we shall examine, at that time, whether appropriate steps were followed when reassigning wastes to a different WMC based on NDE.
The site has procedures for shipment revocation and procedures for notification of CBFO when a container is revoked?	CCP-TP-005 Rev 13	Has a waste stream been revoked based either on AK information or reassessment as part of reconfirmation? If so, was the procedure(s) followed?	Y	Revocation of containers have not occurred, although the site program did lose its certification (hence the apparent implementation of the CCP program)
Until discrepancies are resolved, shipment of the waste stream to the WIPP is prohibited.	CCP-TP-005 Rev 13	If data consistently indicate discrepancies with acceptable knowledge information, the site increases sampling, reassesses the materials and processes that generate the waste, and resubmits waste stream profile information.	Y	No examples to date.

Attachment A.2.1 Nondestructive Assay (NDA) Checklist for the MCS-HENC

Establishment of Required Elements in Procedures	Y/N	Location	Execution of Procedures or Verification of Activity	Y/N	Objective Evidence or Comment
General Reporting Requirements					
Procedures require assay systems to report quantitative values and uncertainties for ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{241}Am, ^{233}U, ^{234}U, ^{238}U, ^{90}Sr, and ^{137}Cs.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.1 (Page 92)	Quantitative values and uncertainties for ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{241}Am, ^{233}U, ^{234}U, ^{238}U, ^{90}Sr, and ^{137}Cs are reported.	Y	Reviewed Radioassay Data Sheets in Batch Data Reports LANDA0001 LANDA0002, LANDA0003, LANDA0004, and LANDA0005
Procedures require that each container disposed of at WIPP contains TRU waste.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.1 (Page 92)	Containers to be disposed of at WIPP meet the definition of TRU waste.	Y	Only payload containers with 100 nCi/g or more of TRU radionuclides can be disposed of at WIPP
NDA instruments and procedures are appropriate for the waste streams and/or waste content codes being assayed.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.1 (Page 83)	NDA instruments and procedures are appropriate for the waste streams and/or waste content codes being assayed.	Y	MCS HENC and its associated procedures are appropriate for S3000 homogenous solids and S5000 debris waste
NDA instruments and procedures result in unbiased values for the cumulative activity of the WIPP radionuclide inventory.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.1 (Page 93)	NDA instruments and procedures result in unbiased values for the cumulative activity of the WIPP radionuclide inventory.	Y	Reviewed calibration of the MCS HENC
Acceptable Knowledge (AK)					
Isotopic ratios for use in qualifying radionuclides are performed by direct measurement or, when AK is used, are qualified by confirmatory testing.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.2 (Page 94)	Isotopic ratios for use in quantifying radionuclides are performed by direct measurement or, when AK is used, are qualified by confirmatory testing.	Y	Isotopic ratios are measured with Multi-Group Analysis (MGA). If default isotopic ratios are unavailable, only radionuclides that are directly measured will be reported.
Lower Level of Detection					
Procedures require that the LLD for each NDA system is determined.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 100)	The LLD for each NDA system has been determined.	Y	Typical LLD values are included in Section 11.0 of the calibration report.
Procedures require that site specific environmental backgrounds and container specific interferences must be accounted for in LLD determinations.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 100)	Site-specific environmental backgrounds and container specific interferences are accounted for in LLD determinations.	Y	The LLD for each radionuclide is estimated by NDA2000 software for each measurement.
NDA instruments performing TRU/low-level waste discrimination measurements are required to have a LLD no greater than 100 nCi/g.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 100)	NDA instruments performing TRU/low-level waste discrimination measurements are required to have a LLD no greater than 100 nCi/g.	Y	Only assay values above the LLD will be reported.
Total Measurement Uncertainty (TMU)					
The method used to calculate the total measurement uncertainty (TMU) for all required quantities must be documented and	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 100)	The method used to calculate the TMU for all required quantities are documented and technically justified.	Y	The TMU determination is documented in *Total Measurement Uncertainty for*

Establishment of Required Elements in Procedures	Y/N	Location	Execution of Procedures or Verification of Activity	Y/N	Objective Evidence or Comment
technically justified.					*the MCS HENC#1 With Integral Gamma Spectrometer*, CI-HENC-TMU-101, Revision 2, 04/28/04
Methods to determine TMU must be reviewed and approved by CBFO for each NDA instrument.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 100)	Methods to determine TMU have been reviewed and approved by CBFO for each NDA instrument.	Y	CBFO Technical Specialist P. Kelly confirmed that the TMU report had been reviewed and approved
Calibration					
Procedures require that each NDA instrument is calibrated before its initial use.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 100)	The NDA instrument has been calibrated before its initial use.	Y	The MCS HENC gamma calibration was performed in March 2004. The passive neutron calibration was performed in 1997, and verified in March 2004. The calibration is documented in *Calibration Report for the MCS HENC#1 Including Passive Neutron Calibration Verification and Gamma Spectrometer Calibration and Confirmation*, MCS-HENC1-NDA-1001, Revision 2, 04/28/04
Site procedures must specify the range of applicability of system calibrations.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 100)	The range of applicability of system calibrations has been specified.	Y	The operating range of the MCS HENC is from the LLD to 100 g WGPu. The density range used for the gamma measurement is from 0.018 to 1.64 g/cm^3.
Procedures require that any matrix/source surrogate waste combinations are representative of the activity ranges and relevant waste matrix characteristics (i.e. densities, effective atomic number, neutron absorber and moderator content) planned for measurement by the system.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 100)	Matrix/source surrogate waste combinations used are representative of the activity ranges and relevant waste matrix characteristics planned for measurement by the system.	Y	Four (4) surrogate drums with waste densities between 0.018 and 1.64 g/cm^3 were used for gamma calibration. Add-a-Source calibration included surrogate drums with the following matrices: concrete combustibles, polyethylene, soft board, particle board, and vermiculite.
Procedures require the use of consensus standards, when such standards exist. If consensus standards do not exist, the calibration technique must be approved by	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 101)	Consensus standards have been used, when such standards exist. If consensus standards do not exist, the calibration technique has been approved by CBFO.	Y	For gamma calibration, six (6) $^{241}Am/^{152}Eu$ line sources were used. For passive neutron calibration, weapons grade

Establishment of Required Elements in Procedures	Y/N	Location	Execution of Procedures or Verification of Activity	Y/N	Objective Evidence or Comment
CBFO.					plutonium oxide (PuO_2) was used.
Procedures require that primary standards be obtained from suppliers maintaining a nationally accredited measurement program.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 101)	Primary standards have been obtained from suppliers maintaining a nationally accredited measurement program	Y	Copies of source certificates for $^{241}Am/^{152}Eu$ line sources are included in Appendix 3 of the calibration report. Copies of source certificates for PuO_2 are included in Appendix 1 of the calibration report.
Calibration Verification					
Procedures require that verification of an NDA instrument's calibration is performed after any of the following occurrences: major system repairs and/or modifications, replacement of the system's components, significant changes to the system's software, and relocation of the system.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 101)	Verification of an NDA instrument's calibration has been performed when required.	Y	Passive neutron calibration verified when the system was relocated from NTS to LANL, software was modified, and gamma spectrometer was added. Verification was performed using drums with 0.5, 3, and 160 g WGPu.
Procedures require recalibration of the system if the calibration verification demonstrates that the system's response has significantly changed.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 101)	Recalibration of the system has been performed if the calibration verification demonstrates that the system's response has significantly changed.	Y	Verification of the passive neutron calibration indicated that the system's response had not significantly changed. No recalibration was required.
Calibration Confirmation					
Procedures require confirmation of the calibration of a system by performing replicate measurements of a non-interfering matrix.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 101)	The calibration of a system has been confirmed by performing replicate measurements of a non-interfering matrix.	Y	Gamma spectrometer calibration has been confirmed by making six (6) replicate measurements for each of three (3) zero-matrix drums.
Procedures require that replicate measurements be performed with containers of the same nominal size as those used for actual waste assays.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 101)	Replicate measurements have been performed with containers of the same nominal size as those used for actual waste assays.	Y	Replicate measurements were made using 55-gallon drums, like those normally assayed.
Procedures require that replicate measurements be performed according to the same procedures used for actual waste assays.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 101)	Replicate measurements have been performed according to the same procedures used for actual waste assays.	Y	CCP-TP-063, *Operating the High Efficiency Neutron Counter Using NDA 2000*, was used for replicate measurements.
Procedures require that replicate measurements be performed using nationally recognized standards or standards derived from nationally recognized standards that span the range of use of the instrument.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Pages 101-102)	Replicate measurements have been performed using nationally recognized standards or standards derived from nationally recognized standards that span the range of use of the instrument.	Y	Sources totaling 0.5, 3, and 160 g WGPu were used for calibration confirmation

Establishment of Required Elements in Procedures	Y/N	Location	Execution of Procedures or Verification of Activity	Y/N	Objective Evidence or Comment
Procedures require that the standards used for calibration confirmation are not the same sources for the most recent calibration.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 102)	The standards used for calibration confirmation are not the same sources for the most recent calibration.	Y	$^{241}Am/^{152}Eu$ line sources used for calibration were not used for calibration confirmation.
Requirements for accuracy, expressed as %R, and precision, expressed as %RSD, must be met.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 102)	Requirements for accuracy and precision have been met.	Y	Requirements for accuracy (70% < %R < 130%) and precision (%RSD < 14%) have been met for each of the three drums assayed.
General Quality Control					
Procedures require that all radioassay and data validation be performed by appropriately trained and qualified personnel.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.4.1 (Page 104)	All radioassay and data validation has been performed by appropriately trained and qualified personnel.	Y	Operators and data reviewers demonstrated the experience and expertise necessary.
Procedures require that requalification of personnel be based on evidence of continued satisfactory performance and is performed at least every two years.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.4.1 (Page 104)	Requalification of personnel be based on evidence of continued satisfactory performance has been performed at least every two years.	Y	Interview with CCP and LANL personnel.
Procedures require that all computer programs, including spreadsheets used for data reduction or analysis, meet the applicable requirements in the QAPD.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.4.1 (Page 104)	All computer programs, including spreadsheets used for data reduction or analysis, meet the applicable requirements in the QAPD.	Y	Software includes NDA2000 3.21. and Genie2000 Virtual Data Manager 2.1.A.
Procedures require that site participate in any relevant measurement comparison programs sponsored or approved by CBFO, including the Performance Demonstration Program (PDP).	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.4.1 (Page 104)	The site has participated in relevant measurement comparison programs sponsored or approved by CBFO.	Y	MCS HENC participated in PDP Cycle 10B. Results are to be submitted to CBFO by 05/15/04.
Background and Performance Checks					
Procedures require daily background measurements, unless otherwise approved by CBFO. Contributions to backgrounds from nearby radiation sources must be carefully controlled, or more frequent backgrounds must be measured.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.4.2 (Page 105)	Daily background measurements have been taken, unless otherwise approved by CBFO. Contributions to backgrounds from nearby radiation sources have been carefully controlled.	Y	Background measurements include gamma background and passive neutron background coincident rate.
Procedures require that system performance checks be performed at least once per operational day.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.4.2 (Page 105)	Performance checks have been performed at least once per operational day.	Y	Reviewed control charts in Batch Data Reports LANDA0001 LANDA0002, LANDA0003, LANDA0004, and LANDA0005
System performance checks must include, as applicable, efficiency, matrix correction checks, and for spectrometry systems peak position and resolution.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.4.2 (Page 105)	Performance checks include, as applicable, efficiency, matrix correction checks, and for spectrometry systems peak position and resolution.	Y	Performance checks include pulser peak centroid, pulser peak rate, 414 keV ^{239}Pu centroid, 414 kev ^{239}Pu HWHM, and ^{240}Pu effective.
Procedures require that at least once per	Y	*CCP Transuranic Waste Plan*,	An interfering matrix is used to assess the	Y	Combustibles and sludge

Establishment of Required Elements in Procedures	Y/N	Location	Execution of Procedures or Verification of Activity	Y/N	Objective Evidence or Comment
operational week an interfering matrix is used to assess the long term stability of the NDA instrument and its matrix corrections.		CCP-PO-002, Revision 9, Section A.4.2 (Page 105)	long term stability of the NDA instrument and its matrix corrections at least once per operational week.		matrices with 3, 27, and 177 g WGPu used in weekly matrix checks.
Procedures require that interfering surrogate waste matrices be constructed in a way that the matrix characteristics do not change over time.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.4.2 (Page 105)	Interfering surrogate waste matrices have been constructed in a way that the matrix characteristics do not change over time.	Y	Interview with CCP and LANL personnel.
Procedures require that sources used for performance checks either be long-lived or decay-corrected.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.4.2 (Page 105)	Sources used for performance checks either are long-lived or decay-corrected.	Y	Plutonium sources used for performance checks is long-lived
Procedures require that performance checks be quantitative and based on 2 and 3 sigma limits.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.4.2 (Page 106)	Performance checks are quantitative and based on 2 and 3 sigma limits.	Y	Limits are based on Student t-test for 95% and 99% confidence intervals.
Data Management					
Procedures require that all radioassay data be reviewed and approved by qualified personnel before being reported to WWIS.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.5.1 (Page 109)	All radioassay data has been reviewed and approved by qualified personnel before being reported to WWIS.	Y	Reviewed Batch Data Reports (BDR) LANDA0001 LANDA0002, LANDA0003, LANDA0004, and LANDA0005
Procedures require that radioassay testing batch reports consist of the following: Testing facility name, testing batch number, container numbers, and signature of the Site Project Officer (SPO) or designee(s) Table of Contents Background and performance check data or control charts for the relevant time period. Data validation per the QAPD and site procedures Separate testing report sheets for each container.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.5.2 (Page 110)	Radioassay testing batch reports consist of the following: Testing facility name, testing batch number, container numbers, and signature of the Site Project Officer (SPO) or designee(s) Table of Contents Background and performance check data or control charts for the relevant time period. Data validation per the QAPD and site procedures Separate testing report sheets for each container.	Y	Reviewed BDR LANDA0001 LANDA0002, LANDA0003, LANDA0004, and LANDA0005 BDRs included Radioassay Data Sheets (RDS) for each container.
Procedures require that testing report sheets include: • Title "Radioassay Data Sheet" • Method/procedure used • Date of radioassay • Activities and associated TMU for individual radionuclides • TRU alpha concentration and its	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.4.5.2 (Pages 110-111)	Testing report sheets 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	Y	Reviewed BDR LANDA0001 (RDS LA00000059024, LA00000059032, and LA00000059047), BDR LANDA0002 (RDS LA00000059019 and LA00000059043), BDR LANDA0003 (RDS LAS850170, LAS850174, and

Establishment of Required Elements in Procedures	Y/N	Location	Execution of Procedures or Verification of Activity	Y/N	Objective Evidence or Comment
associated TMU • Operator signature • Reviewer signature			• Operator signature • Reviewer signature		LAS850176) BDR LANDA0004 (RDS LAS850252, LAS850163, LAS850201, LAS850143, LAS860306, LAS870642, and LA00000059070), and BDR LANDA0005 (RDS LAS850287, LAS870640, and LAS850350)
Procedures require that the following nonpermanent records be maintained at the radioassay-testing facility or forwarded to the site project office: • Testing batch reports • All raw data, including instrument readouts, calculation records, and radioassay QC results • All applicable instrument calibration reports	Y	CCP-PO-002, Revision 6, Section A.4.5.3 (Page 111)	The following nonpermanent records be maintained at the radioassay-testing facility or forwarded to the site project office: • Testing batch reports • All raw data, including instrument readouts, calculation records, and radioassay QC results • All applicable instrument calibration reports	Y	Operators back-up data to compact discs weekly. Raw data are included in records sent to site office

Attachment A.2.2 Nondestructive Assay (NDA) Checklist for the PTGS

Establishment of Required Elements in Procedures	Y/N	Location	Execution of Procedures or Verification of Activity	Y/N	Objective Evidence or Comment
General Reporting Requirements					
Procedures require assay systems to report quantitative values and uncertainties for ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{241}Am, ^{233}U, ^{234}U, ^{238}U, ^{90}Sr, and ^{137}Cs.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.1 (Page 92)	Quantitative values and uncertainties for ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{241}Am, ^{233}U, ^{234}U, ^{238}U, ^{90}Sr, and ^{137}Cs are reported.	Y	Reviewed control charts in Batch Data Reports LA04-PTGS-001 and LA04-PTGS-003.
Procedures require that each container disposed of at WIPP contains TRU waste.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.1 (Page 92)	Containers to be disposed of at WIPP meet the definition of TRU waste.	Y	Only payload containers with 100 nCi/g or more of TRU radionuclides can be disposed of at WIPP.
NDA instruments and procedures are appropriate for the waste streams and/or waste content codes being assayed.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.1 (Page 83)	NDA instruments and procedures are appropriate for the waste streams and/or waste content codes being assayed.	Y	PTGS and its associated procedures are appropriate for S5000 debris waste.
NDA instruments and procedures result in unbiased values for the cumulative activity of the WIPP radionuclide inventory.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.1 (Page 93)	NDA instruments and procedures result in unbiased values for the cumulative activity of the WIPP radionuclide inventory.	Y	Reviewed calibration of the PTGS.
Acceptable Knowledge (AK)					
Isotopic ratios for use in qualifying radionuclides are performed by direct measurement or, when AK is used, are qualified by confirmatory testing.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.2 (Page 94)	Isotopic ratios for use in quantifying radionuclides are performed by direct measurement or, when AK is used, are qualified by confirmatory testing.	Y	Isotopic ratios measured with PC-FRAM. AK indicates that debris waste is primarily weapons grade plutonium.
Lower Level of Detection					
Procedures require that the lower limit of detection (LLD) for each NDA system is determined.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 100)	The lower limit of detection (LLD) for each NDA system has been determined.	Y	The LLD determination is documented in Minimum Detectability and Precision Error Analysis of the PTGS, RRES/EA-2004-475, 02/19/04
Procedures require that site specific environmental backgrounds and container specific interferences must be accounted for in LLD determinations.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 100)	Site-specific environmental backgrounds and container specific interferences are accounted for in LLD determinations.	Y	Assays below 2 g ^{239}Pu are reviewed to insure that reported values were above the LLD
NDA instruments performing TRU/low-level waste discrimination measurements are required to have a LLD no greater than 100 nCi/g.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 100)	NDA instruments performing TRU/low-level waste discrimination measurements are required to have a LLD no greater than 100 nCi/g.	Y	Only assay values above the LLD will be reported.
Total Measurement Uncertainty (TMU)					

Establishment of Required Elements in Procedures	Y/N	Location	Execution of Procedures or Verification of Activity	Y/N	Objective Evidence or Comment
The method used to calculate the total measurement uncertainty (TMU) for all required quantities must be documented and technically justified.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 100)	The method used to calculate the total measurement uncertainty (TMU) for all required quantities are documented and technically justified.	Y	The TMU determination is documented in *Method for Computing Total Measurement Uncertainty for the Portable TGS System*,TWCP-09491, 08/29/02.
Methods to determine TMU must be reviewed and approved by CBFO for each NDA instrument.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 100)	Methods to determine TMU have been reviewed and approved by CBFO for each NDA instrument.	Y	CBFO Technical Specialist P. Kelly confirmed that the TMU report had been reviewed and approved
Calibration					
Procedures require that each NDA instrument is calibrated before its initial use.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 100)	The NDA instrument has been calibrated before its initial use.	Y	The PTGS was calibrated in December 2003. The calibration was documented in *Portable TGS Mass Calibration and Calibration for Pu-239*, RRES-CH:04-005, 01/07/04.
Site procedures must specify the range of applicability of system calibrations.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 100)	The range of applicability of system calibrations has been specified.	Y	The calibration range of the PTGS is from 0.6 to 189 g WGPu.
Procedures require that any matrix/source surrogate waste combinations are representative of the activity ranges and relevant waste matrix characteristics (i.e. densities, effective atomic number, neutron absorber and moderator content) planned for measurement by the system.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 100)	Matrix/source surrogate waste combinations used are representative of the activity ranges and relevant waste matrix characteristics planned for measurement by the system.	Y	The calibration was performed using a combustibles matrix similar to the waste to be assayed.
Procedures require the use of consensus standards, when such standards exist. If consensus standards do not exist, the calibration technique must be approved by CBFO.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 101)	Consensus standards have been used, when such standards exist. If consensus standards do not exist, the calibration technique has been approved by CBFO.	Y	Standards used for calibration included combinations of plutonium oxide (PuO_2) sources totaling 0, 0.6, 3, 10, 25, 150, and 189 g WGPu.
Procedures require that primary standards be obtained from suppliers maintaining a nationally accredited measurement program.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 101)	Primary standards have been obtained from suppliers maintaining a nationally accredited measurement program	Y	Reviewed source certificates for calibration sources listed in the calibration report.
Calibration Verification					
Procedures require that verification of an NDA instrument's calibration is performed	Y	*CCP Transuranic Waste Plan*, CCP-PO-002,	Verification of an NDA instrument's calibration has been performed when	Y	Calibration verification has not been required.

Establishment of Required Elements in Procedures	Y/N	Location	Execution of Procedures or Verification of Activity	Y/N	Objective Evidence or Comment
after any of the following occurrences: major system repairs and/or modifications, replacement of the system's components, significant changes to the system's software, and relocation of the system.		Revision 9, Section A.3 (Page 101)	required.		(Recalibration was performed after the system was relocated because the detector crystal was re-annealed, a new ^{109}Cd rate loss source was installed, a new ^{75}Se transmission sources as installed, and the system was relocated.
Procedures require recalibration of the system if the calibration verification demonstrates that the system's response has significantly changed.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 101)	Recalibration of the system has been performed if the calibration verification demonstrates that the system's response has significantly changed.	Y	Recalibration has not been required.
Calibration Confirmation					
Procedures require confirmation of the calibration of a system by performing replicate measurements of a non-interfering matrix.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 101)	The calibration of a system has been confirmed by performing replicate measurements of a non-interfering matrix.	Y	Calibration confirmation has been performed by making six (6) replicate measurements for each of three (3) drums containing 1.3, 9, and 160 g WGPu in a non-interfering matrix.
Procedures require that replicate measurements be performed with containers of the same nominal size as those used for actual waste assays.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 101)	Replicate measurements have been performed with containers of the same nominal size as those used for actual waste assays.	Y	Replicate measurements were made using 55-gallon drums of the same size and shape as those to be assayed.
Procedures require that replicate measurements be performed according to the same procedures used for actual waste assays.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 101)	Replicate measurements have been performed according to the same procedures used for actual waste assays.	Y	Replicate measurements were made using CCP-TP-126, *Waste Assay Using the Portable Tomographic Gamma Scanner*, the same procedure used for normal assays.
Procedures require that replicate measurements be performed using nationally recognized standards or standards derived from nationally recognized standards that span the range of use of the instrument.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Pages 101-102)	Replicate measurements have been performed using nationally recognized standards or standards derived from nationally recognized standards that span the range of use of the instrument.	Y	Reviewed source certificates for calibration confirmation sources listed in the calibration report. (Source certificates are included in *Calibration and Confirmation Plan for the Portable Tomographic Gamma Scanner*, RRES-CH:03-023, 11/06/03)

Establishment of Required Elements in Procedures	Y/N	Location	Execution of Procedures or Verification of Activity	Y/N	Objective Evidence or Comment
Procedures require that the standards used for calibration confirmation are not the same sources for the most recent calibration.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 102)	The standards used for calibration confirmation are not the same sources for the most recent calibration.	Y	Standards used for calibration are not the same as those used for calibration.
Requirements for accuracy, expressed as %R, and precision, expressed as %RSD, must be met.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.3 (Page 102)	Requirements for accuracy and precision have been met.	Y	Accuracy (70% < %R < 130%) and precision (%RSD < 14%) have been met for each of the three mass loadings.
General Quality Control					
Procedures require that all radioassay and data validation be performed by appropriately trained and qualified personnel.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.4.1 (Page 104)	All radioassay and data validation has been performed by appropriately trained and qualified personnel.	Y	Operators and data reviewers demonstrated the experience and expertise necessary for the task.
Procedures require that requalification of personnel be based on evidence of continued satisfactory performance and is performed at least every two years.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.4.1 (Page 104)	Requalification of personnel be based on evidence of continued satisfactory performance has been performed at least every two years.	Y	Interview with CCP and LANL personnel.
Procedures require that all computer programs, including spreadsheets used for data reduction or analysis, meet the applicable requirements in the QAPD.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.4.1 (Page 104)	All computer programs, including spreadsheets used for data reduction or analysis, meet the applicable requirements in the QAPD.	Y	Software includes MasterScan 3.1.6, Maaestro 5.10, and MasterAnalysis 2.1.1.
Procedures require that site participate in any relevant measurement comparison programs sponsored or approved by CBFO, including the Performance Demonstration Program (PDP).	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.4.1 (Page 104)	The site has participated in relevant measurement comparison programs sponsored or approved by CBFO.	Y	PTGS participated in PDP Cycle 10B. Results are to be submitted to CBFO by 05/15/04.
Background and Performance Checks					
Procedures require daily background measurements, unless otherwise approved by CBFO. Contributions to backgrounds from nearby radiation sources must be carefully controlled, or more frequent backgrounds must be measured.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.4.2 (Page 105)	Daily background measurements have been taken, unless otherwise approved by CBFO. Contributions to backgrounds from nearby radiation sources have been carefully controlled.	Y	TGS Background measured at 414 keV (^{239}Pu).
Procedures require that system performance checks be performed at least once per operational day.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.4.2 (Page 105)	Performance checks have been performed at least once per operational day.	Y	Reviewed control charts in BDR LA04-PTGS-001 and LA04-PTGS-003.
System performance checks must include, as applicable, efficiency, matrix correction checks, and for spectrometry systems peak position and resolution.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.4.2 (Page 105)	Performance checks include, as applicable, efficiency, matrix correction checks, and for spectrometry systems peak position and resolution.	Y	Performance checks include 356 keV TGS# (^{133}Ba), FWHM at 88 keV (^{109}Cd), FWHM at 356 keV (^{133}Ba), Peak Centroid at 88 keV

Establishment of Required Elements in Procedures	Y/N	Location	Execution of Procedures or Verification of Activity	Y/N	Objective Evidence or Comment
					(^{109}Cd), Peak Centroid at 356 keV (^{133}Ba),
Procedures require that at least once per operational week an interfering matrix is used to assess the long term stability of the NDA instrument and its matrix corrections.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.4.2 (Page 105)	An interfering matrix is used to assess the long term stability of the NDA instrument and its matrix corrections at least once per operational week.	Y	Combustibles matrix with 3, 27, and 177 g WGPu used in weekly matrix checks.
Procedures require that interfering surrogate waste matrices be constructed in a way that the matrix characteristics do not change over time.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.4.2 (Page 105)	Interfering surrogate waste matrices have been constructed in a way that the matrix characteristics do not change over time.	Y	Interview with CCP and LANL personnel.
Procedures require that sources used for performance checks either be long-lived or decay-corrected.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.4.2 (Page 105)	Sources used for performance checks either are long-lived or decay-corrected.	Y	^{133}Ba source used for performance checks.
Procedures require that performance checks be quantitative and based on 2 and 3 sigma limits.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.4.2 (Page 106)	Performance checks are quantitative and based on 2 and 3 sigma limits.	Y	Limits are based on Student t-test for 95% and 99% confidence intervals.
Data Management					
Procedures require that all radioassay data be reviewed and approved by qualified personnel before being reported to WWIS.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.5.1 (Page 109)	All radioassay data has been reviewed and approved by qualified personnel before being reported to WWIS.	Y	Reviewed BDR LA04-PTGS-001 and LA04-PTGS-003.
Procedures require that radioassay testing batch reports consist of the following: Testing facility name, testing batch number, container numbers, and signature of the Site Project Officer (SPO) or designee(s) Table of Contents Background and performance check data or control charts for the relevant time period. Data validation per the QAPD and site procedures Separate testing report sheets for each container.	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.5.2 (Page 110)	Radioassay testing batch reports consist of the following: Testing facility name, testing batch number, container numbers, and signature of the Site Project Officer (SPO) or designee(s) Table of Contents Background and performance check data or control charts for the relevant time period. Data validation per the QAPD and site procedures Separate testing report sheets for each container.	Y	Reviewed BDR LA04-PTGS-001 and LA04-PTGS-003. Radioassay Data Sheets (RDS) included for each container.
Procedures require that testing report sheets include: • Title "Radioassay Data Sheet" • Method/procedure used	Y	*CCP Transuranic Waste Plan*, CCP-PO-002, Revision 9, Section A.4.5.2 (Pages 110-111)	Testing report sheets include: • Title "Radioassay Data Sheet" • Method/procedure used • Date of radioassay	Y	Reviewed BDR LA04-PTGS-001 (RDS for drums LA00000059062, LA00000059076, and LA00000059077) and

Establishment of Required Elements in Procedures	Y/N	Location	Execution of Procedures or Verification of Activity	Y/N	Objective Evidence or Comment
• Date of radioassay • Activities and associated TMU for individual radionuclides • TRU alpha concentration and its associated TMU • Operator signature • Reviewer signature			• Activities and associated TMU for individual radionuclides • TRU alpha concentration and its associated TMU • Operator signature • Reviewer signature		BDR LA04-PTGS-003 (RDS for drums LA00000059075, LA00000059372, and LA00000059404)
Procedures require that the following nonpermanent records be maintained at the radioassay-testing facility or forwarded to the site project office: • Testing batch reports • All raw data, including instrument readouts, calculation records, and radioassay QC results • All applicable instrument calibration reports	Y	CCP-PO-002, Revision 6, Section A.4.5.3 (Page 111)	The following nonpermanent records be maintained at the radioassay-testing facility or forwarded to the site project office: • Testing batch reports • All raw data, including instrument readouts, calculation records, and radioassay QC results • All applicable instrument calibration reports	Y	All raw data are included on two (2) compact discs submitted with each BDR to the site office.

Attachment A.3 Real-Time Radiography (RTR) Checklist

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
Site procedures identify required training and qualifications for RTR personnel RTR operators are instructed in the specific waste generating practices and typical packaging configurations expected to be found in each matrix parameter category at the site.	Y CCP-QP-002, Rev 15, Training & Qualification-Plan	• Employee's explanation of job duties was consistent with applicable procedures • Operator could name prohibited items • Operator's explanation of required actions if prohibited items were encountered was consistent with procedure • Operator could identify applicable policies and procedures governing the operation of RTR equipment • Operator adequately explained the consequences of misidentifying prohibited items • RTR operators passed a training drum test that includes items common to the waste streams generated/stored at the site. • RTR operators identify the limitations of their system and explain what the process of identifying and managing drums with prohibited items. • Operator's training was consistent with applicable procedures • Operator's certification is current	Y Y Y Y Y Y	Comparison of CCP-TP-053, Rev 1, "CCP Standard RTR Inspection Procedure" requirements and the RTR of drum #59062 by Mr. Leon Martinez showed that job done was consistent w/ procedure, prohibited items could be identified and appropriate action taken, and consequences of misidentification. Training drum videotapes were reviewed for both Mr. Leon Martinez and Mr. Paul Martinez. Training records were reviewed and found to be consistent with the requirements in the procedures, CCP-TP-028, Rev 2, "CCP Radiographic Test & Training Drum Requirements" and CCP-QP-002, Rev 15 "Training Qualification Plan"

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
There is a procedure for determining if the resolution of the RTR equipment is sufficient to image the types of waste and waste containers likely to be encountered at this site. The procedure allows the operator to adjust RTR to accommodate the physical properties of the waste and waste containers likely to be encountered at this site	Y CCP-TP-053, Rev 1, "CCP Standard Real-Time Radiography (RTR) Inspection Procedure", Sections 4.3 & 4.4	Operator adequately explained how to adjust the system to image the range of wastes likely to be encountered at this specific site The RTR system could be adjusted Operator adequately explained how the presence of free liquids is determined Operator adequately explained how the acceptability of an image is determined Operator adequately explained what is done if an image is unacceptable (e.g., the waste is solidified or the container is lead-lined) The X-ray producing device has controls that allow the operator to vary voltage, thereby controlling image quality High-density material was examined with the X-ray device set on the maximum voltage Low-density material was examined at lower voltage settings to improve contrast and image definition	Y Y Y Y Y Y Y Y	X-Ray energy was varied over its entire range of operation. "Opaque" drums are rejected. X-Ray energy was varied during the inspection. Review of the operators training video indicated satisfactory knowledge of detecting free liquids. During observation of the RTR of drum#59399, the operator demonstrated acceptable image detail and quality and indicated that lead lined barrels are rejected. The operator varied voltage regularly and source amperage several times during all observed RTR activities (observed, reviewed video, and training) Voltage settings were appropriate to the density of material examined. Voltage settings were appropriate to the density of material examined.
		RTR tape is high quality, the sound track is audible, and the required information is contained on the audible portion of the tape. The RTR tape is consistent with the data package for the same drum.	Y	Videotape of the following drums was reviewed: S850170, 174, 176, 360, 473, 477, & 595, and drums 59314, 59372, & 59404
Procedures require that RTR operators receive the results of the VE/RTR comparison	Y CCP-TP-003, A-13, Rev 0, "CCP Radiography-VE Comparison Report"	RTR operators receive the results of the VE/RTR comparison	Y	Review of procedure, CCP-TP-003 A13, Rev 0, "CCP Radiography VE Comparison Report"

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
There is a procedure for determining whether the waste stream assignment, hazardous waste codes, and weights were correctly assigned	Y CCP-TP-003, Rev 14, "CCP Sampling Design & Data Analysis"	• The procedure is adequately implemented • Corrective actions are taken when necessary • Does the RTR operator use a standard weight lookup table to provide an estimate of WMP weights? If so, has the table been updated to reflect additional information gained through previous RTR/VE exams or updated AK information?	Y Y Y	Comparison of actual work practices to the procedural requirements supports adequate implementation. Numerous NCR's indicate that corrective action has been taken (See RTR Concern #1) Procedure requires updating of the weight tables, but not enough waste has been through the process to provide useful updates.
		The site evaluates the accuracy and reproducibility of data, for example: Independent replicate scans and replicate observations of the RTR recording are performed Independent replicate examinations are performed on one waste container per day per testing (whichever is less frequent) Independent observations of one examination (not the replicate) are performed once per day per testing, whichever is less frequent, by a qualified RTR operator (anyone but the initial RTR operator) Oversight functions, including periodic audio/videotape reviews of accepted waste containers, are performed by qualified radiography personnel other than the operator.	 Y Y Y Y	 Replicate scans with independent review were performed. Independent review was performed by knowledgeable RTR staff. Independent review was regularly performed. Independent reviews were regularly performed.

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comment
		Site implemented an "automated" RTR data entry system to facilitate data entry to the WWIS. Direct data entry into an electronic form is done by the RTR operator using a computer while the operator is still in the RTR booth. The electronic data file undergoes the same quality control (QC) checks used for hand-written data entries	NA Y Y	LANL/CCP is a new CCP site and therefore operators still enter all data into the WWIS manually/by hand. Interviewed Leon Martinez and observed RTR on drums #59062, 59064, & 59414.
		RTR operator has received "lessons learned" information based on the comparison of RTR and VE data.	Y	Review of CCP-TP-003, Rev 14, "CCP Sampling Design & Data Analysis. Supporting documentation indicated this requirement would be met.
		RTR operator adequately explained the process followed for examining a drum and entering data into data forms (whether hard copy or electronic data entry is used).	Y	Interviewed Leon Martinez and observed RTR on drums #59062, 59064, & 59414.

Attachment A.4 Visual Examination (VE) Checklist

Establishment of Required Technical Elements in Procedures	Y/N and Location	Execution of Procedures	Y/N	Objective Evidence/Comment
Site procedures identify required training and qualifications for VE personnel	Y CCP-TP-113 rev 1 Section 2.2 Page 6 CCP-QP-002	• VE expert's explanation of job duties was consistent with applicable procedures • VE expert could name prohibited items • VE expert's explanation of required actions if prohibited items were encountered was consistent with procedure • VE expert could identify applicable policies and procedures governing the operation of VE equipment • VE expert adequately explained the consequences of misidentifying prohibited items	Y Y Y Y Y	Compared CCP-TP-113 Section 4 with the operator description of their work on demonstration drum 59399 Interviewed T. Mojica VE Expert and observation of VE on Drum #59399
		• VE expert's training was consistent with applicable procedures • VE expert's certification is current	Y Y	Reviewed training records.
		• VE expert identified the types of waste matrices, parameters, and specific items likely to be encountered at this specific site • Operator identified typical items • Operator identified the various waste container packaging configurations and liners • VE expert had been tested on examining waste containers with items common to the waste streams generated/stored at the site	Y Y Y Y	Interviewed T. Mojica VE Expert and observation of VE on Drum #59399 Interviewed T. Mojica VE Expert and observation of VE on Drum #59399 and reviewed training drum tape.
		• VE expert/reader's explanation of how to operate the data recording system was consistent with applicable procedures • The video camera was focused prior to the start of VE • VE expert's verbal description of the inner bag/package's inventory was recorded • If an automated data entry system is used, the VE expert could navigate through the various screens	Y Y Y Y	Interviewed T. Mojica VE Expert and observation of VE on Drum #59399 & S850162.

Establishment of Required Technical Elements in Procedures	Y/N and Location	Execution of Procedures	Y/N	Objective Evidence/Comment
Current versions of all relevant procedures and technical guidance documents were located in the VE room	Y Procedure CCP-TP-113 rev 1 was present along with several DOP's governing VE operations	VE procedures: • instruct employees on how to conduct a VE from start to finish • are sufficiently detailed to enable the operator to determine if a waste container meets the criteria of §194.24 with regard to identifying applicable parameters with waste limits • outline the steps to be taken by the examiner if a prohibited item is identified • establish standard nomenclature, based on current site practice, so that all staff recognize waste by the same descriptors	 Y Y Y Y	Reviewed Procedure CCP-TP-113 rev 1, "Standard-Waste-Visual-Examination" The procedure, "CCP-TP-113 rev 1, "Standard-Waste-Visual-Examination"" was available in the RTR trailer. CCP-TP-113 rev 1, "Standard-Waste-Visual-Examination" specifies actions to be taken when a prohibited item is found. See VE Concern #1
There is a procedure for handling instances when the VE Expert is unable to see through the inner plastic bags/packages/containers of waste The VE expert has decision making criteria for assessing the need to open the bags/packages in order to identify all of their contents	Y Procedure CCP-TP-113 rev 1 Step 4.1.4 F	• If the bags are not opened, a brief written description of the contents of the bags is prepared with estimates of the amount of each waste type in the bags • The site uses AK to identify the matrix parameter category and to estimate waste material parameters present	Y Y	Reviewed Procedure CCP-TP-113 rev 1 Step 4.1.4 F Reviewed Procedure CCP-TP-113 rev 1 Step 4.1.4 F
		Prior to starting the VE, the VE expert reviewed all documented data related to the waste container and its contents: If the VE expert determined in advance to open all bags/packages in a waste container of a particular TRUCON code, matrix parameter category, and/or IDC, this decision was based on AK or data from previous examinations of the waste The VE expert documented the basis for these decisions	 Y Y	Reviewed Procedure CCP-TP-113 rev 1 Step 4.1.4 F Reviewed Procedure CCP-TP-113 rev 1 Step 4.1.4

Establishment of Required Technical Elements in Procedures	Y/N and Location	Execution of Procedures	Y/N	Objective Evidence/Comment
		VE staff have access to standardized charts or tables to aid in the consistent estimation/ assignment of weights, waste material parameters, and waste matrix codes	Y	Waste was actually weighed. The VE operator identified each item (potentially with the aid of the console operator), aggregates by WMP and weighs them.
		• The estimated WMP weights are determined by compiling an inventory of waste items, residual materials and packaging materials	N/A	Each WMP was actually weighed.
		• The items on the inventory are sorted by WMP and combined with a standard weight look-up table to provide an estimate of WMP weights	Y	Each WMP was actually weighed
		• Reference tables are updated as the site gains information from VE	N/A	Each WMP was actually weighed
		The VE expert's description of the contents of the waste container include:		
		• height and shape of the waste in the container, so that the volume of the container and the volume utilization percentage can be determined	Y	See VE Concern #1
		• estimation of the utilized waste container volume percentage using the highest point and shape of waste in a waste container	Y	See VE Concern #1
		The VE expert describes the location, container, and estimated volume (as a percent of the container volume and depth of liquid within the container) of any liquids detected	Y	The procedure (CCP-TP-113 rev 1, "Standard-Waste-Visual-Examination") requires it, though no liquid was present during our observation.
		VE staff record the VE image and observations		A videotaped visual image was recorded simultaneous with an audio description.
		• A VE data form is used to document the matrix parameter category and estimated WMP weights of the waste	Y	
		• An audio/videotape is made of the waste container exam and maintained as a nonpermanent record	Y	

Establishment of Required Technical Elements in Procedures	Y/N and Location	Execution of Procedures	Y/N	Objective Evidence/Comment
		The number of liners and types of liners present in the waste container is documented • Individual inner bags/packages, if present, are removed from the poly liner(s) • All inner bag/packages are labeled and weighed using a calibrated mass balance	 Y Y	The identification, opening, removing, and weighing of liner bags was observed during the VE examination of drum #59399.
		The inventory includes a description of all waste items, residual materials, packaging materials, and/or waste material parameters contained both in and outside of the inner bag/package Estimates of the weights of the waste items, residual materials, packaging materials and/or waste material parameters are recorded on both audiotape and the VE data form The weight of the empty container and its rigid poly liner, if present, is recorded and documented The gross weight of the waste container (container plus contents) is recorded on the VE data form The total number of bags/packages is recorded on the data form	 Y Y Y Y	The identification, weighing and recording of weights for drum, liner, waste, and any residual material was observed during the VE examination of drum #59399. This information: was captured on the videotape as a visual image; was captured on the same videotape as an audio description made by the console operator; and entered into the VE Data From by the console operator.

Establishment of Required Technical Elements in Procedures	Y/N and Location	Execution of Procedures	Y/N	Objective Evidence/Comment
		VE testing data reports: • provide batch/sample identification number • identify the appropriate matrix parameter categories listed in the BIR • contain information sufficient to estimate weights of waste material parameters • contain data review checklists for each test verifying that the data generation level review, validation, and verification took place	Y Y Y Y	VE Data Reports were reviewed as part of BDR's LA VE 500001, LA VE 500003, and LA VE 500005.
There is a procedure for determining whether the waste stream assignment, hazardous waste codes, and weights were correctly assigned	Y Procedure CCP-TP-113 rev 1 Step 4.1.4	• The procedure is adequately implemented • Corrective actions are taken when necessary	Y Y	A comparison between the procedural requirements and the actual practices confirmed adequate implementation. Numerous NCR's have been generated and were reviewed as evidence of taking appropriate corrective actions.
		The site evaluates the accuracy and reproducibility of data, for example: Independent replicate weighing of 1/20 items and replicate observations of the VE video are performed Independent replicate exams are performed on one waste container per day per testing (whichever is less frequent) Independent observations of one exam (not the replicate exam) are performed once per day per testing, whichever is less frequent, by a qualified VE expert (anyone but the initial VE expert)	Y Y Y	Replicate testing and independent review of the A/V record were performed. VE rarely examines more than four containers in a day. An independent VE expert is present every day and observes and reviews VE performance.

Establishment of Required Technical Elements in Procedures	Y/N and Location	Execution of Procedures	Y/N	Objective Evidence/Comment
		The VE expert assesses the accuracy of the TRUCON code, matrix parameter category, and/or IDC The VE expert recommends and documents changes	Y Y	Interviews with the VE Expert, T. Mojica indicate that these tasks are performed.
		Prior to videotaping/recording a VE, operational checks are conducted at the beginning of each work shift these checks include observation of a test pattern to ensure that the VE system has adequate video quality	Y	The inspection team observed the VE examination of drum #59399 and observed a quality check and review of the A/V system.
The site has a procedure for using the data obtained from VE to determine the percentage of miscertified waste containers The site uses a historical miscertification rate of 2% to calculate the number of waste containers that must be visually examined in the first year The site established a site-specific miscertification rate The site's revised miscertification rate is based on the last 12 (or more) months of certification activities The facility has a procedure for randomly selecting waste containers	Y CCP-TP-003, Rev14, "CCP Sampling Design & Data Analysis" Section 4.8-10 CCP-TP-003-A14 Rev0, "CCP-Miscertification-Rate-Calculations"	• The annual number of waste containers undergoing characterization is appropriately calculated • The miscertification rate is within the range presented in Table 5-1, p. 19 of the QAPP (1% to 6%). If not, alternative calculations are provided for review. • Only waste containers certified for compliance with WIPP-WAC and TRAMPAC were randomly selected	Y N/A Y	The drums were counted. LANL/CCP is a new site and they have not performed enough drum examinations to be able to perform the statistical analysis required to calculate a miscertification rate. Only potentially WIPP bound drums are included in the VE pool used to verify RTR.
The facility has a replacement strategy for selecting waste containers The replacement strategy is restricted to a waste stream or waste stream lot that, through the random selection process, happens to have container(s) identified for VE	CCP-TP-003, Rev14, "CCP Sampling Design & Data Analysis" Section 4.13	• Replacement VE is performed on the sampled containers • If fewer containers were visually examined than were sampled, the replacements were selected randomly from the population of sampled containers • The replacement containers were from a different lot	Y NA NA	Except in the case of solidified sludges "solids" are not removed from the parent container. The condition has not yet occurred at LANL/CCP

Establishment of Required Technical Elements in Procedures	Y/N and Location	Execution of Procedures	Y/N	Objective Evidence/Comment
		• Once containers have been visually examined, the UCL_{90} for the proportion miscertified is calculated	Y	This condition has not yet occurred at LANL/CCP, but procedures require it.
		• The site adequately demonstrated that corrective actions taken after VE of containers to improve certification accuracy are not used to adjust the visual examination results and the UCL_{90}	Y	This condition has not yet occurred at LANL/CCP, but procedures require it.
		• The site has used the appropriate distribution for the UCL_{90} calculation to determine N.	Y	This condition has not yet occurred at LANL/CCP, but procedures require it.

Attachment A.5: WIPP Waste Information System (WWIS)

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comments
Procedures require WWIS and Data Expert/Staff to be trained to assess data and properly enter/transfer data in the WWIS	Y CCP-TP-103, Rev 2, "CCP Data Reviewing Validating & Reporting"	Employee's explanation of job duties was consistent with applicable procedures	Y	Interviews w\ J. R. Stroble and B. Trujillo confirmed that job duties was consistent with applicable procedures.
	CCP-QP-002, Rev 15, "Training & Qualification Plan" CCP-TP-030, Rev 11, "CCP TRU Waste Certification and WWIS Data Entry"	WWIS and Data Expert/Staff are trained to assess data and properly enter and transfer all data in the WWIS Data entry personnel and data reviewers/verifiers are trained on the WWIS system using the WIPP Waste Information System User's Manual and the appropriate site procedures?	Y Y	Interviewed B. Trujillo, WCO and J. R. Stroble, SCO/TCO. Observed sample data entry using the WIPP test instance. Interviewed B. Trujillo, WCO and J. R. Stroble, SCO/TCO. Observed sample data entry using the WIPP test instance.
		WWIS and Data Expert/Staff adequately explained how data are assessed, input, and transferred into the WWIS?	Y	Interviewed B. Trujillo (WCO) and observed sample data input.
		For those sites entering data into WWIS using electronic methods, data entry personnel and data reviewers/verifiers are trained on the site's data system using appropriate site procedures	N/A	LANL/CCP is a new CCP site and WWIS data entry is done manually.
		Generation level data review checklists and reports are complete and have been verified by SPO and SQAO review for each waste container	Y	Review of procedure CCP-TP-030, Rev 11, "CCP TRU Waste Certification and WWIS Data Entry" showed that review checklists are verified to be complete and verified.
		Generation level data packages contain the following information: Sampling, testing, and batch analytical data reports Data review checklists Reviews and verification of generation level data packages are complete	Y	Review of numerous RTR and VE BDR's demonstrated that checklists are present and include the necessary elements.

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comments
		Project level data packages contain the following information for each waste container: • Data validation summary • Analytical results Reviews of project level data packages are complete	Y	Review of numerous RTR and VE BDR's demonstrated that checklists are present and include the necessary elements.
There are adequate procedures for treatment of nonconforming data	Y CCP-QP-005, Rev 9, "CCP TRU Nonconforming Item Reporting and Control"	Procedures for nonconforming data are adequately implemented	Y	CCP-QP-005, Rev 9, "CCP TRU Nonconforming Item Reporting and Control"
Security measures for ensuring data integrity and accessing WWIS are sufficient System access Access log review	Y CCP-TP-030, Rev 11, "CCP TRU Waste Certification and WWIS Data Entry"	Procedures are in place to ensure adequate WWIS security	Y	CCP-TP-030, Rev 11, "CCP TRU Waste Certification and WWIS Data Entry"
There are adequate procedures for entering data into the WWIS	Y CCP-TP-030, Rev 11, "CCP TRU Waste Certification and WWIS Data Entry"	Procedures for entering data into the WWIS are adequately implemented	Y	Comparison fo procedural requirements in CCP-TP-030, Rev 11, "CCP TRU Waste Certification and WWIS Data Entry" and the actual WWIS practices did verify adequate implementation.
		Data entered into the WWIS is consistent with WIPP requirements, i.e., data fields are populated.	Y	Review of procedure CCP-TP-030, Rev 11, "CCP TRU Waste Certification and WWIS Data Entry" was consistent w/ WIPP requirements.
The edit/limit checks contained in the WWIS system are appropriate for the site Approved radioassay methods Approved characterization methods Approved analyte detection methods	Y CCP-TP-030, Rev 11, "CCP TRU Waste Certification and WWIS Data Entry"	The edit limit checks are appropriate.	Y	Observation of sample data entry demonstrated that edit limit checks were appropriate.

Establishment of Required Technical Elements in Procedures	Y/N Location	Execution of Procedures	Y/N	Objective Evidence/Comments
		The site adequately demonstrated its ability to transmit waste container characterization data to the WIPP using the WWIS	Y	Sample data was entered into the WWIS "test instance" and transmitted successfully to the WIPP.
		The site adequately demonstrated its ability to receive information from the WIPP via the WWIS, including E-mail notifications.	Y	Sample data was entered into the WWIS "test instance" and transmitted successfully to the WIPP and a confirmation email was returned.
		The site adequately demonstrated its ability to print the appropriate waste container characterization data reports for data submitted to WIPP using the WWIS	Y	A printout of the sample data was produced.
The site has adequate procedures that require verification of the accuracy of waste container characterization data submitted to and received by WIPP using the WWIS Waste container data reports are required to be reconciled with site data	Y CCP-TP-103, Rev 2, "CCP Data Reviewing Validating & Reporting"	Waste container characterization data submitted to and received by WIPP are verified Waste container data reports are reconciled with site data	Y Y	The verification of the returned sample data was demonstrated. Waste container data reports were demonstrated to be reconciled with site data
Procedures for waste container characterization data submitted to WIPP using the WWIS require that the following records be kept: WWIS access requests WWIS access logs Waste container data input reports WWIS waste container data reports	Y CCP-TP-030, Rev 11, "CCP TRU Waste Certification and WWIS Data Entry"	The following records are kept: WWIS access requests WWIS access logs Waste container data input reports WWIS waste container data reports	Y	A WWIS records review confirmed that appropriate records are kept.

Attachments B.1 through B.6

Attachment B.1: Replicate Testing Data for Container LAS850170 Assayed on the MCS-HENC

Quantity of Interest	Original Measurement			Replicate No. 1			Replicate No. 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
^{235}U Activity (Ci)	1.24E-06	4.27E-07	34.4%	1.20E-06	2.90E-07	24.2%	1.27E-06	3.07E-07	24.2%
^{238}U Activity (Ci)			N/A			N/A			N/A
^{238}Pu Activity (Ci)			N/A			N/A			N/A
^{239}Pu Activity (Ci)			N/A			N/A			N/A
^{240}Pu Activity (Ci)			N/A			N/A			N/A
^{241}Pu Activity (Ci)			N/A			N/A			N/A
^{242}Pu Activity (Ci)			N/A			N/A			N/A
^{241}Am Activity (Ci)	4.22E-03	1.34E-03	31.8%	4.18E-03	7.91E-04	18.9%	4.19E-03	7.92E-04	18.9%
^{90}Sr Activity (Ci)	1.04E-06	3.35E-07	32.2%	8.72E-07	1.75E-07	20.1%	8.79E-07	1.76E-07	20.0%
^{137}Cs Activity (Ci)	1.04E-06	3.35E-07	32.2%	8.72E-07	1.75E-07	20.1%	8.79E-07	1.76E-07	20.0%
^{237}Np Activity (Ci)	1.00E-06	3.53E-07	35.3%	8.45E-07	2.22E-07	26.3%	9.20E-07	2.22E-07	24.1%
^{243}Cm Activity (Ci)	4.01E-06	1.35E-06	33.7%	3.04E-06	6.91E-07	22.7%	3.53E-06	7.56E-07	21.4%
TRU Alpha Conc. (nCi/g)	31	10	31.7%	31	6	18.9%	31	6	18.9%

Quantity of Interest	Replicate No. 3			Replicate No. 4			Replicate No. 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
^{235}U Activity (Ci)	9.08E-07	2.37E-07	26.1%	1.15E-06	2.78E-07	24.2%	1.18E-06	2.73E-07	23.1%
^{238}U Activity (Ci)			N/A	6.27E-06	1.93E-06	30.8%			N/A
^{238}Pu Activity (Ci)			N/A			N/A			N/A
^{239}Pu Activity (Ci)			N/A			N/A			N/A
^{240}Pu Activity (Ci)			N/A			N/A			N/A
^{241}Pu Activity (Ci)			N/A			N/A			N/A
^{242}Pu Activity (Ci)			N/A			N/A			N/A
^{241}Am Activity (Ci)	4.20E-03	7.95E-04	18.9%	4.23E-03	8.00E-04	18.9%	4.20E-03	7.94E-04	18.9%
^{90}Sr Activity (Ci)	8.27E-07	1.68E-07	20.3%	9.45E-07	1.88E-07	19.9%	9.29E-07	1.85E-07	19.9%
^{137}Cs Activity (Ci)	8.27E-07	1.68E-07	20.3%	9.45E-07	1.88E-07	19.9%	9.29E-07	1.85E-07	19.9%
^{237}Np Activity (Ci)	1.13E-06	2.67E-07	23.6%	1.16E-06	2.57E-07	22.2%	1.14E-06	2.47E-07	21.7%
^{243}Cm Activity (Ci)	3.99E-06	8.74E-07	21.9%	3.87E-06	8.28E-07	21.4%	3.85E-06	8.56E-07	22.2%
TRU Alpha Conc. (nCi/g)	31	6	18.9%	31	6	18.9%	31	6	18.9%

Attachment B.2: Replicate Testing Results for Container LAS850170 Assayed on the MCS-HENC

Quantity of Interest	Original Measurement		Sample Mean	Sample Standard Deviation	Relative Standard Deviation	Relative Difference	χ^2	t
	Reported Value	Absolute Uncertainty						
^{233}U Activity (Ci)								
^{234}U Activity (Ci)								
^{238}U Activity (Ci)	1.24E-06	4.27E-07	1.14E-06	1.38E-07	12.08%	7.94%	0.417	0.652
^{235}U Activity (Ci)			6.27E-06					
^{238}Pu Activity (Ci)								
^{239}Pu Activity (Ci)								
^{240}Pu Activity (Ci)								
^{241}Pu Activity (Ci)								
^{242}Pu Activity (Ci)								
^{241}Am Activity (Ci)	4.22E-03	1.34E-03	4.20E-03	1.87E-05	0.45%	0.47%	0.001	0.976
^{137}Cs/^{90}Sr Activity (Ci)	1.04E-06	3.35E-07	8.90E-07	4.73E-08	5.32%	14.38%	0.080	2.886
^{237}Np Activity (Ci)	1.00E-06	3.53E-07	1.04E-06	1.46E-07	14.02%	-3.90%	0.681	-0.244
^{243}Cm Activity (Ci)	4.01E-06	1.35E-06	3.66E-06	3.84E-07	10.51%	8.83%	0.324	0.841
TRU Alpha Conc. (nCi/g)	31	10	31	0	0.45%	0.48%	0.001	0.971

Quantity of Interest	$Pr(x<\|\chi^2\|)$	χ^2 Test	$Pr(x<\|t\|)$	t Test
^{233}U Activity (Ci)		Not Applicable		Not Applicable
^{234}U Activity (Ci)		Not Applicable		Not Applicable
^{235}U Activity (Ci)	98.11%	Not Significant	55.02%	Not Significant
^{238}U Activity (Ci)		Not Applicable		Not Applicable
^{238}Pu Activity (Ci)		Not Applicable		Not Applicable
^{239}Pu Activity (Ci)		Not Applicable		Not Applicable
^{240}Pu Activity (Ci)		Not Applicable		Not Applicable
^{241}Pu Activity (Ci)		Not Applicable		Not Applicable
^{242}Pu Activity (Ci)		Not Applicable		Not Applicable
^{241}Am Activity (Ci)	100.00%	Not Significant	38.44%	Not Significant
^{137}Cs/^{90}Sr Activity (Ci)	99.92%	Not Significant	4.48%	Significant
^{237}Np Activity (Ci)	95.36%	Not Significant	81.90%	Not Significant
^{243}Cm Activity (Ci)	98.82%	Not Significant	44.76%	Not Significant
TRU Alpha Conc. (nCi/g)	100.00%	Not Significant	38.64%	Not Significant

Attachment B.3: Replicate Testing Data for Container LA00000059032 Assayed on the MCS-HENC

Quantity of Interest	Original Measurement			Replicate No. 1			Replicate No. 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
^{235}U Activity (Ci)			N/A			N/A			N/A
^{238}U Activity (Ci)			N/A			N/A			N/A
^{238}Pu Activity (Ci)	2.69E-04	5.50E-05	20.4%	3.02E-04	4.96E-05	16.4%	3.02E-04	4.95E-05	16.4%
^{239}Pu Activity (Ci)	9.30E-03	1.38E-03	14.8%	1.05E-02	1.08E-03	10.3%	1.05E-02	1.07E-03	10.2%
^{240}Pu Activity (Ci)	2.18E-03	4.45E-04	20.4%	2.45E-03	4.28E-04	17.5%	2.45E-03	4.27E-04	17.4%
^{241}Pu Activity (Ci)	2.99E-02	6.11E-03	20.4%	3.34E-02	5.85E-03	17.5%	3.34E-02	5.84E-03	17.5%
^{242}Pu Activity (Ci)	1.25E-07	2.56E-08	20.5%	1.41E-07	2.47E-08	17.5%	1.41E-07	2.46E-08	17.4%
^{241}Am Activity (Ci)	3.84E-04	4.93E-05	12.8%	4.38E-04	3.85E-05	8.8%	4.37E-04	3.84E-05	8.8%
^{137}Cs/^{90}Sr Activity (Ci)			N/A			N/A			N/A
^{237}Np Activity (Ci)	3.28E-06	4.18E-07	12.7%	3.03E-06	2.62E-07	8.6%	2.94E-06	2.53E-07	8.6%
^{243}Am Activity (Ci)			N/A	1.04E-05	1.09E-06	10.5%			N/A
^{243}Cm Activity (Ci)	1.11E-05	1.41E-06	12.7%			N/A	1.08E-05	9.29E-07	8.6%
TRU Alpha Conc. (nCi/g)	490	59	12.0%	553	47	8.5%	553	47	8.4%

Quantity of Interest	Replicate No. 3			Replicate No. 4			Replicate No. 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
^{235}U Activity (Ci)			N/A			N/A			N/A
^{238}U Activity (Ci)			N/A			N/A			N/A
^{238}Pu Activity (Ci)	3.54E-04	5.72E-05	16.2%	2.97E-04	4.86E-05	16.4%	3.58E-04	5.79E-05	16.2%
^{239}Pu Activity (Ci)	1.23E-02	1.21E-03	9.8%	1.03E-02	1.05E-03	10.2%	1.24E-02	1.23E-03	9.9%
^{240}Pu Activity (Ci)	2.87E-03	4.95E-04	17.2%	2.40E-03	4.19E-04	17.5%	2.90E-03	5.01E-04	17.3%
^{241}Pu Activity (Ci)	3.92E-02	6.76E-03	17.2%	3.28E-02	5.73E-03	17.5%	3.96E-02	6.84E-03	17.3%
^{242}Pu Activity (Ci)	1.65E-07	2.85E-08	17.3%	1.38E-07	2.41E-08	17.5%	1.67E-07	2.88E-08	17.2%
^{241}Am Activity (Ci)	4.35E-04	3.82E-05	8.8%	4.35E-04	3.82E-05	8.8%	4.30E-04	3.78E-05	8.8%
^{137}Cs/^{90}Sr Activity (Ci)			N/A			N/A			N/A
^{237}Np Activity (Ci)	3.01E-06	2.60E-07	8.6%	2.94E-06	2.54E-07	8.6%	2.97E-06	2.57E-07	8.7%
^{243}Am Activity (Ci)			N/A	1.03E-05	1.13E-06	11.0%	1.06E-05	1.10E-06	10.4%
^{243}Cm Activity (Ci)	1.04E-05	8.92E-07	8.6%			N/A			N/A
TRU Alpha Conc. (nCi/g)	644	53	8.2%	542	46	8.4%	649	54	8.3%

Attachment B.4: Replicate Testing Results for Container LA00000059032 Assayed on the MCS-HENC

Quantity of Interest	Original Measurement		Sample Mean	Sample Standard Deviation	Relative Standard Deviation	Relative Difference	χ^2	t
	Reported Value	Absolute Uncertainty						
^{233}U Activity (Ci)								
^{234}U Activity (Ci)								
^{235}U Activity (Ci)								
^{238}U Activity (Ci)								
^{238}Pu Activity (Ci)	2.69E-04	5.50E-05	3.23E-04	3.06E-05	9.48%	-19.93%	1.237	-1.599
^{239}Pu Activity (Ci)	9.30E-03	1.38E-03	1.12E-02	1.05E-03	9.41%	-20.43%	2.331	-1.646
^{240}Pu Activity (Ci)	2.18E-03	4.45E-04	2.61E-03	2.48E-04	9.50%	-19.91%	1.247	-1.595
^{241}Pu Activity (Ci)	2.99E-02	6.11E-03	3.57E-02	3.41E-03	9.55%	-19.33%	1.244	-1.548
^{242}Pu Activity (Ci)	1.25E-07	2.56E-08	1.50E-07	1.43E-08	9.52%	-20.32%	1.250	-1.620
^{241}Am Activity (Ci)	3.84E-04	4.93E-05	4.35E-04	3.08E-06	0.71%	-13.28%	0.016	-15.105
^{137}Cs/^{90}Sr Activity (Ci)								
^{237}Np Activity (Ci)	3.28E-06	4.18E-07	2.98E-06	4.09E-08	1.37%	9.21%	0.038	6.746
^{243}Am Activity (Ci)			1.04E-05	1.53E-07	1.46%			
^{243}Cm Activity (Ci)	1.11E-05	1.41E-06	1.06E-05	2.83E-07	2.67%	4.50%	0.040	1.443
TRU Alpha Conc. (nCi/g)	490	59	588	54	9.12%	-20.07%	3.359	-1.673

Quantity of Interest	Pr(x <|χ^2|)	χ^2 Test	Pr(x <|t|)	t Test
^{233}U Activity (Ci)		Not Applicable		Not Applicable
^{234}U Activity (Ci)		Not Applicable		Not Applicable
^{235}U Activity (Ci)		Not Applicable		Not Applicable
^{238}U Activity (Ci)		Not Applicable		Not Applicable
^{238}Pu Activity (Ci)	87.19%	Not Significant	18.50%	Not Significant
^{239}Pu Activity (Ci)	67.51%	Not Significant	17.51%	Not Significant
^{240}Pu Activity (Ci)	87.03%	Not Significant	18.60%	Not Significant
^{241}Pu Activity (Ci)	87.08%	Not Significant	19.64%	Not Significant
^{242}Pu Activity (Ci)	86.98%	Not Significant	18.05%	Not Significant
^{241}Am Activity (Ci)	100.00%	Not Significant	0.01%	Highly Significant
^{137}Cs/^{90}Sr Activity (Ci)		Not Applicable		Not Applicable
^{237}Np Activity (Ci)	99.98%	Not Significant	0.25%	Highly Significant
^{243}Am Activity (Ci)				
^{243}Cm Activity (Ci)	84.10%	Not Significant	38.57%	Not Significant
TRU Alpha Conc. (nCi/g)	49.97%	Not Significant	16.97%	Not Significant

Attachment B.5: Replicate Testing Data for Container LA00000059062 Assayed on the PTGS

Quantity of Interest	Original Measurement			Replicate No. 1			Replicate No. 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
^{235}U Activity (Ci)	6.01E-07	1.14E-07	19.0%	6.06E-07	1.17E-07	19.3%	6.42E-07	1.23E-07	19.2%
^{238}U Activity (Ci)			N/A			N/A			N/A
^{238}Pu Activity (Ci)	1.93E-01	2.33E-02	12.1%	1.81E-01	2.20E-02	12.2%	2.02E-01	2.44E-02	12.1%
^{239}Pu Activity (Ci)	5.07E+00	5.96E-01	11.8%	4.96E+00	5.84E-01	11.8%	5.20E+00	6.12E-01	11.8%
^{240}Pu Activity (Ci)	1.19E+00	1.40E-01	11.8%	1.16E+00	1.37E-01	11.8%	1.19E+00	1.41E-01	11.8%
^{241}Pu Activity (Ci)	1.20E+01	1.42E+00	11.8%	1.17E+01	1.38E+00	11.8%	1.23E+01	1.45E+00	11.8%
^{242}Pu Activity (Ci)	3.12E-05	8.61E-06	27.6%	3.03E-05	8.37E-06	27.6%	3.10E-05	8.56E-06	27.6%
^{241}Am Activity (Ci)	1.08E+00	1.27E-01	11.8%	1.07E+00	1.26E-01	11.8%	1.12E+00	1.31E-01	11.7%
^{137}Cs/^{90}Sr Activity (Ci)	1.82E-07	2.34E-08	12.9%	1.65E-07	2.17E-08	13.2%	1.50E-07	2.02E-08	13.5%
^{243}Am Activity (Ci)	2.18E-05	2.58E-06	11.8%	2.03E-05	2.41E-06	11.9%	2.16E-05	2.57E-06	11.9%
^{237}Np Activity (Ci)	2.24E-05	2.63E-06	11.7%	2.18E-05	2.57E-06	11.8%	2.30E-05	2.70E-06	11.7%
^{231}Pa Activity (Ci)	6.36E-06	1.28E-06	20.1%	6.23E-06	1.29E-06	20.7%			N/A
TRU Alpha Conc. (nCi/g)	341,000	28,300	8.3%	334,000	27,800	8.3%	349,000	29,000	8.3%

Quantity of Interest	Replicate No. 3			Replicate No. 4			Replicate No. 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
^{235}U Activity (Ci)	7.34E-07	1.29E-07	17.6%	7.22E-07	1.29E-07	17.9%	5.98E-07	1.20E-07	20.1%
^{238}U Activity (Ci)			N/A			N/A			N/A
^{238}Pu Activity (Ci)	1.96E-01	2.37E-02	12.1%	1.88E-01	2.29E-02	12.2%	1.91E-01	2.31E-02	12.1%
^{239}Pu Activity (Ci)	5.16E+00	6.05E-01	11.7%	5.23E+00	6.15E-01	11.8%	5.24E+00	6.15E-01	11.7%
^{240}Pu Activity (Ci)	1.19E+00	1.41E-01	11.8%	1.21E+00	1.43E-01	11.8%	1.24E+00	1.46E-01	11.8%
^{241}Pu Activity (Ci)	1.21E+01	1.43E+00	11.8%	1.23E+01	1.45E+00	11.8%	1.24E+01	1.45E+00	11.7%
^{242}Pu Activity (Ci)	3.11E-05	8.58E-06	27.6%	3.14E-05	8.67E-06	27.6%	3.24E-05	8.95E-06	27.6%
^{241}Am Activity (Ci)	1.10E+00	1.30E-01	11.8%	1.11E+00	1.31E-01	11.8%	1.13E+00	1.32E-01	11.7%
^{137}Cs/^{90}Sr Activity (Ci)	2.03E-07	2.59E-08	12.8%	1.57E-07	2.10E-08	13.4%	1.79E-07	2.34E-08	13.1%
^{243}Am Activity (Ci)	2.15E-05	2.54E-06	11.8%	2.14E-05	2.55E-06	11.9%	2.17E-05	2.56E-06	11.8%
^{237}Np Activity (Ci)	2.26E-05	2.66E-06	11.8%	2.29E-05	2.70E-06	11.8%	2.28E-05	2.67E-06	11.7%
^{231}Pa Activity (Ci)	6.78E-06	1.36E-06	20.1%	5.75E-06	1.31E-06	22.8%	6.62E-06	1.35E-06	20.4%
TRU Alpha Conc. (nCi/g)	346,000	28,700	8.3%	350,000	29,200	8.3%	353,000	29,200	8.3%